

U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-255 585

CHARACTERIZATION AND EVALUATION OF WASTEWATER
SOURCES UNITED STATES STEEL CORPORATION, NATIONAL
PLANT, PITTSBURGH, PENNSYLVANIA, FEBRUARY 3-6, 1976

NATIONAL ENFORCEMENT INVESTIGATIONS
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212037

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SPRINGFIELD, VA. 22161

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA/330/2-76/026	2.	3. Recipient's Accession No. PB-255 585																				
4. Title and Subtitle Characterization and Evaluation of Wastewater Sources United States Steel Corporation, National Plant, Pittsburgh, Pennsylvania, February 3-6, 1976.		5. Report Date May 76	6.																				
7. Author(s)		8. Performing Organization Rept. No.																					
9. Performing Organization Name and Address National Enforcement Investigations Center, Denver, Colo.		10. Project/Task/Work Unit No.																					
12. Sponsoring Organization Name and Address Environmental Protection Agency, Philadelphia, Pa. Region III.		11. Contract/Grant No.																					
		13. Type of Report & Period Covered																					
15. Supplementary Notes		14.																					
16. Abstracts The National Steel Plant and the Duquesne Steel Plant are operated under a single management unit known as the National-Duquesne Works. The National Plant is located on the Monongahela River at McKeesport, Pa., immediately upstream of and across the river from the Duquesne Plant. The National Plant primarily produces finished tubular products and electric weld pipe for steel plates and coils. Process water is pumped from the Monongahela River and is supplemented with treated water purchased from the City of McKeesport. Wastewater is discharged from outfalls 001-010* (Figs. 1, 2, 3.). All wasteloads discharged from outfalls 002-010 are computed on a net basis.																							
17. Key Words and Document Analysis. 17a. Descriptors <table border="0"> <tr> <td>*Industrial wastes,</td> <td>Greases,</td> </tr> <tr> <td>*Water pollution,</td> <td>Trace elements,</td> </tr> <tr> <td>*Steel plants,</td> <td>Metals,</td> </tr> <tr> <td>*Monongahela River,</td> <td>Zinc,</td> </tr> <tr> <td>Concentration (Composition),</td> <td>Cyanides,</td> </tr> <tr> <td>Effluents,</td> <td>Pen</td> </tr> <tr> <td>Outfall sewers,</td> <td></td> </tr> <tr> <td>Organic compounds,</td> <td></td> </tr> <tr> <td>Phenols,</td> <td></td> </tr> <tr> <td>Oils,</td> <td></td> </tr> </table>				*Industrial wastes,	Greases,	*Water pollution,	Trace elements,	*Steel plants,	Metals,	*Monongahela River,	Zinc,	Concentration (Composition),	Cyanides,	Effluents,	Pen	Outfall sewers,		Organic compounds,		Phenols,		Oils,	
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Phenols,																							
Oils,																							
17b. Identifiers/Open-Ended Terms *Water quality data, Oil wastes, Pittsburgh(Pennsylvania), United States Steel Corporation, National Steel Plant.																							
17c. COSATI Field/Group 13 B,																							
18. Availability Statement National Technical Information Service Springfield, Va. 22161		19. Security Class (This Report) UNCLASSIFIED	21. No. of Pages 113																				
		20. Security Class (This Page) UNCLASSIFIED	22. Price \$5.50/\$2.25																				

Environmental Protection Agency
Office of Enforcement

CHARACTERIZATION AND EVALUATION OF WASTEWATER SOURCES
UNITED STATES STEEL CORPORATION

NATIONAL PLANT
PITTSBURGH, PENNSYLVANIA

February 3-6, 1976

May 1976

REPRODUCED BY
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SPRINGFIELD, VA. 22161

National Enforcement Investigations Center - Denver, Colorado
and
Region III - Philadelphia, Pennsylvania

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I. INTRODUCTION

The National Steel Plant and the Duquesne Steel Plant are operated under a single management unit known as the National-Duquesne Works. The National Plant is located on the Monongahela River at McKeesport, Pa., immediately upstream of and across the river from the Duquesne Plant.

The National Plant, also known as the National Tube Division Plant, primarily produces finished tubular products and electric weld pipe for steel plates and coils. Portions of the plant were originally constructed in the late 1800's with improvement and expansion through the 1960's. The plant currently consists of the following major operations:

- Nos. 1 and 2 Seamless Tube Mills
- Nos. 1 and 2 Bloom Mills
- 32-inch Bar Mill
- Electroplating
- Electric Resistance Weld (ERW) Mill
- Submerged Arc Weld Mill
- Three Blast Furnaces (Nos. 1, 2, 4)
(only No. 1 blast furnace is operational
and has been converted to ferromanganese
production)

Process water is pumped from the Monongahela River and is supplemented with treated water purchased from the City of McKeesport. Under normal operating conditions, the theoretical intake volume would be 246,000 m³/day (65 mgd).

Wastewater is discharged from outfalls 001-010* [Figs. 1, 2, 3]. All wasteloads discharged from outfalls 002-010 are computed on a net

* Outfalls 011-017 are located at the Duquesne Plant.

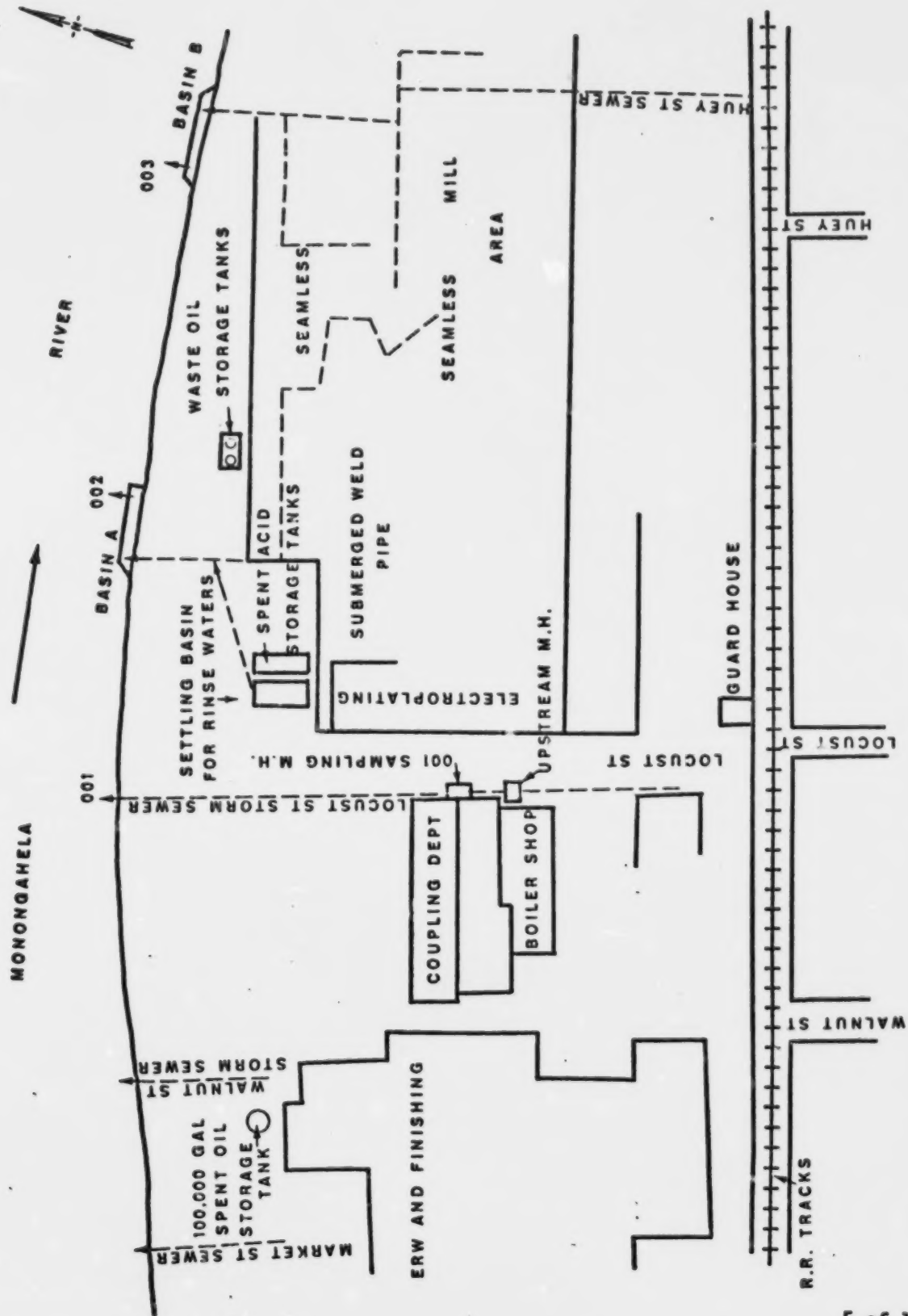


Figure 1. USSC National Steel Plant McKeesport, Pennsylvania

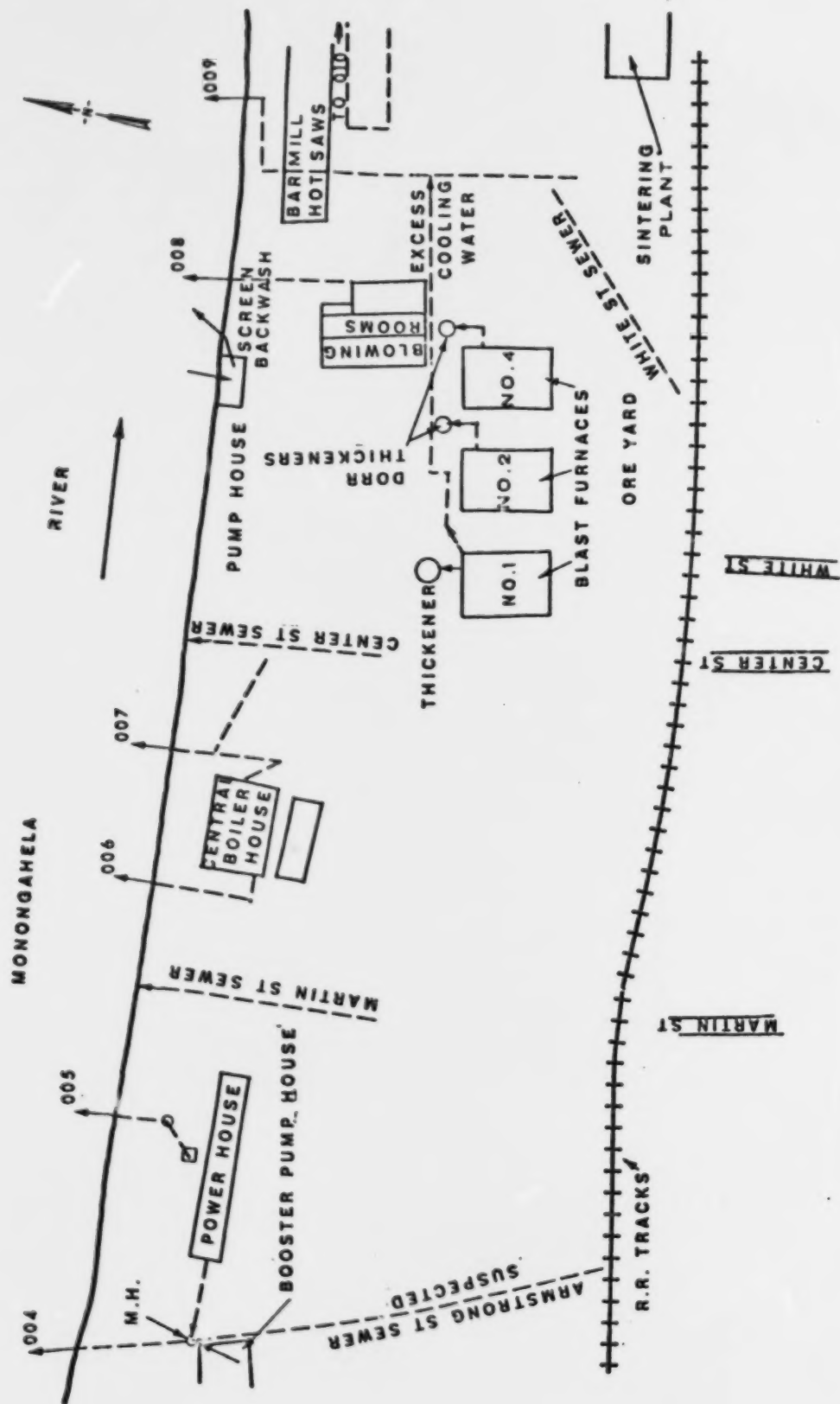


Figure 2. USSC National Steel Plant McKeesport, Pennsylvania

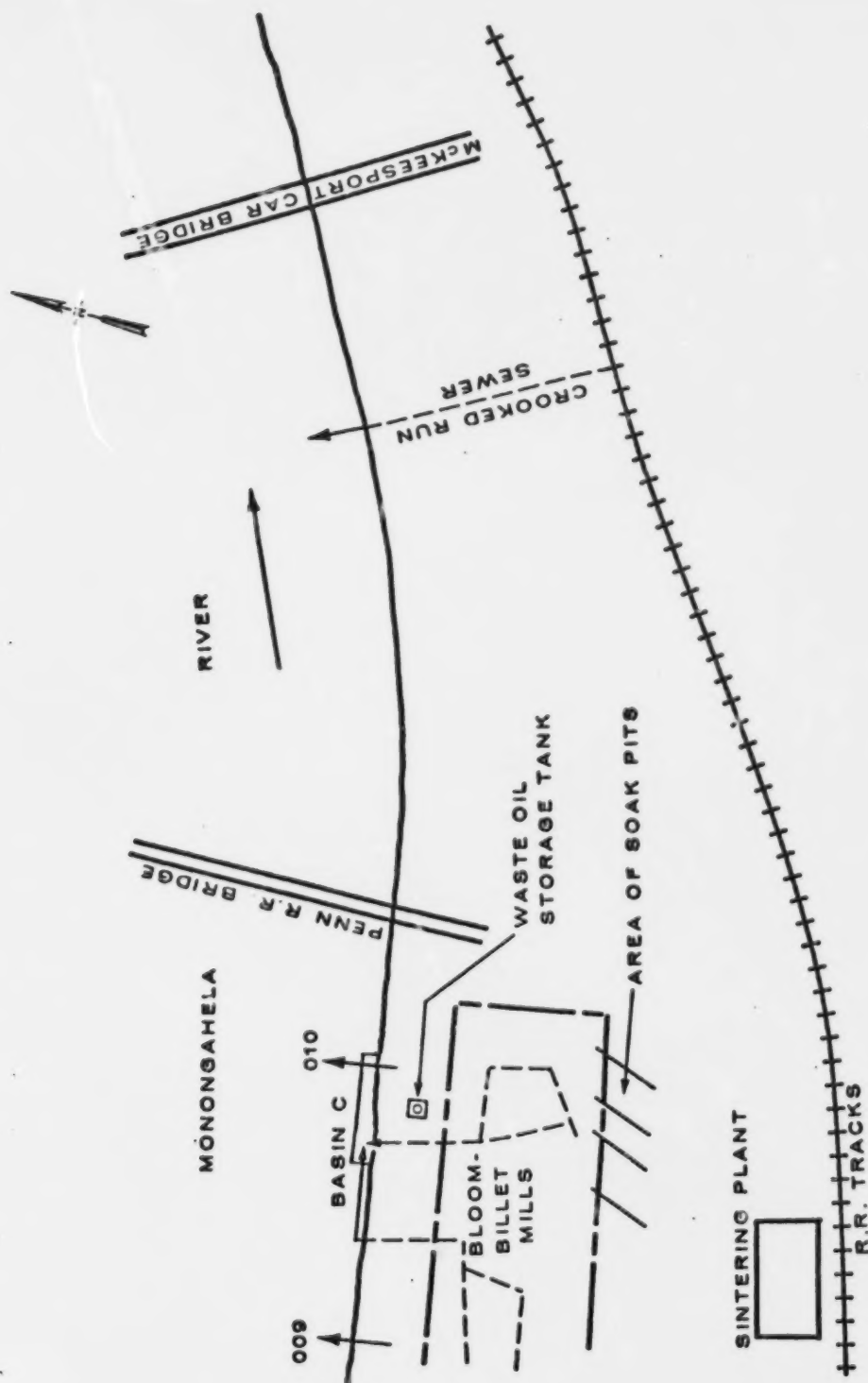


Figure 3. USSC National Steel Plant McKeesport, Pennsylvania

basis. According to USSC,¹ city water is used for air compressor cooling water in the Coupling Tap Building and is discharged directly to outfall 001 without recycle. Therefore, the wasteloads discharged from outfall 001 are computed on a gross basis. Instantaneous flows are measured over a 5-minute period by Company personnel, using lithium chloride solution as a tracer.*¹ The solution is injected upsewer of the outfall and samples of the wastewater collected at 1-minute intervals. The samples are analyzed on a photometer for lithium and the flow is calculated from this concentration. The maximum of the five 1-minute instantaneous flows is assumed to remain constant over 24 hours and is reported as the daily flow.

There are three terminal settling basins (A, B, and C) on outfalls 002, 003 and 010, respectively, intended for solids and oil/grease (O/G)** removal. The basins were constructed on the bank of the Monongahela River; however, the effluent structures are not protected from high river stages. When the river level exceeds elevation 720.2 ft, river water flows into the effluent channel and floods the basins. The three blast furnaces, Nos. 1, 2 and 4 are served by thickeners. Only No. 1 blast furnace is operational; blast furnaces No. 2 and 4 and their associated thickeners have been shut down. Process wastewaters from the No. 1 blast furnace thickener are recycled to the blast furnace. The other blast furnaces will only become operational if additional production is required.¹ Caustic and acid rinse wastewaters from the plating operation are discharged to basin A after being detained in a concrete basin. There are no provisions for the collection and removal of oils, solids or other material from this concrete basin. All other wastewaters are discharged without treatment. [A description of each outfall and USSC-reported flows are provided in Table 1.] All domestic wastewater

* *Technique used at all outfalls except 002. The Manning Equation is used to determine flows for 002.*

** *Freon extractable material*

Table 1
OUTFALL DESCRIPTION
USSC NATIONAL PLANT

No.	Description	Reported Flow [†] (mgd) [†]
001	Cooling water from the boiler shop. Outfall is the terminus of the Locust Street sewer	0.12
002	Process wastewater from the electric weld pipe mill, treated in settling basin A.	5.0
003	Process wastewater from the seamless pipe mills, treated in scale pits and settling basin B. Outfall is terminus of Huey Street sewer.	6.0
004	Cooling water from the booster water pumping station. Outfall is reported as terminus of Armstrong Street sewer.	8.0
005	Barometric condenser cooling water from a 10,000 kW turbine-generator, plus air compressor cooling water from the booster pump station.	0.5
006	Cooling water from the Central Boiler House.	5.0
007	Process water from the Central Boiler House.	1.0
008	Steam condensate from barometric condenser in the Blow House plus cooling water from the No. 1 blast furnace.	12
009	Excess cooling water from all blast furnaces. Outfall is the terminus of the White Street storm sewer.	10
010	Process wastes from sinter plant, gas washer system, bloom and bar finishing mills, treated in settling basin C.	12

† *USSC response to 308 request, dated November 17, 1975 from S. R. Wassersug. Response dated January 28, 1976 from James L. Hamilton III, Manager Environmental Control - Water.*

is discharged to the City of McKeesport sewers and treated at the municipal treatment plant.¹

Due to high river conditions, outfalls 002, 003, 004, 005, 006, 008, 009 and 010 were submerged and representative samples could not be collected during the NEIC monitoring survey. In-plant monitoring of outfalls 001, 007, excess cooling water discharged from the No. 1 blast furnace, river intake water and screen backwash water, and the No. 1 blast furnace thickener influent and effluent was conducted February 3-6, 1976. This report summarizes the results of the survey. Additional data for the National Plant are reported in the reconnaissance report, *Report on EPA Reconnaissance/Inspection of September 23-27, 1975 and Preliminary Evaluation for Prospective NEIC Sampling Survey, U. S. Steel Corporation, National Steel Plant, McKeesport, Pa.* [Appendix A]. The Duquesne Plant survey results are summarized in a separate report.

II. SUMMARY

1. Due to high river conditions, outfalls 002, 003, 004, 005, 006, 008, 009 and 010 were submerged during the NEIC monitoring period February 3-6, 1976. Therefore only the wastewaters discharged from outfalls 001 and 007 were monitored. In addition, the excess cooling water discharged from the No. 1 blast furnace, the river intake water and screen backwash water, and the No. 1 blast furnace thickener influent and effluent were also monitored.

Flows were not determined for any wastewater discharge. Therefore pollutant loads could not be calculated. All composite samples were combined on an equal-volume basis and therefore represent only an estimate of the pollutants contained in the daily discharges.

2. According to USSC, the only source of wastewater discharged to the Locust Street storm sewer (terminus of the storm sewer is outfall C01) is cooling water from the air compressor in the Coupling Tap Building. The water is purchased from the City of McKeesport.

Grab samples were collected once per day because prior to the survey it was believed that only cooling water was being discharged. The TSS and O/G concentrations averaged 210 mg/l and 200 mg/l, respectively. Total iron concentrations averaged 6.7 mg/l. The concentrations are not characteristic of cooling water. The high iron, TSS, and O/G concentrations discharged on all three days indicate that process wastewaters were being discharged.

The NPDES* permit only requires that temperature and pH be monitored.

* *National Pollutant Discharge Elimination System*

The high pollutant concentrations require that additional parameters be limited and monitored. The monitoring location is adequate.

3. Outfall 007 contains blowdown water from the blow house and sludges from the hot lime-soda ash process and filter backwashes. The TSS increased an average of 53 mg/l over intake concentrations; there was no net increase in O/G, total or dissolved iron concentrations.

USSC has proposed the following effluent limitations for TSS on a net basis.

<u>Daily Average</u> kg/day lb/day		<u>Daily Maximum</u> kg/day lb/day	
328	721	984	2,163

Based on the average flows reported by USSC, the estimated net TSS loads discharged during the NEIC survey were only 60% and 39% of the proposed average and maximum limitations. Since boiler blowdown wastes and sludges are discharged from this outfall, net limitations for this outfall may not be applicable. The sludges and filter backwashes are not treated before discharge. The boiler water is softened and filtered and therefore the pollutants in the blowdown wastes are not influenced by the intake levels. The outfall should be limited on a gross basis.

The monitoring location at the river is satisfactory.

4. During the NEIC survey, the No. 1 blast furnace was operating at about 105% of its rated capacity for FeMn production. The influent and effluent of the Eimco thickener serving the blast furnace were monitored to determine the treatment efficiencies. According to USSC, there is no blowdown from the thickener and feed water is only added to make up for evaporation losses and the water removed with the settled solids.

Data submitted by USSC for 1971-1973 show that approximately 88% of the TSS was removed by the thickener. The NEIC data show that only 46% of the TSS was removed. Since flows were not measured by USSC or NEIC, thus precluding flow-weighted composite samples, the data is only a rough estimate of the treatment efficiencies. NEIC results show that approximately 93% of the settleable solids, 12% of the cyanide, and 3% of the phenol were removed. O/G was not removed and there was an increase in ammonia and total iron on all three days.

5. The characteristics of the excess cooling water from the No. 1 blast furnace, discharged to the White Street storm sewer, were equivalent to the intake waters.

6. The river intake volumes during the survey averaged 217,800 m³/day (57.5 mgd). The USSC-estimated volume of wastewater discharged from outfalls 001-010 is 225,000 m³/day (59.6 mgd), or about 4% greater than the total intake volume.

TSS and settleable solids concentrations of the intake screen backwash water were equivalent to the intake water concentrations.

7. The National Plant personnel measure flows by injecting a lithium chloride solution upsewer of the outfalls (except outfall 002) over a 5-minute period and analyze the discharges for lithium. The instantaneous flow is calculated and is used as the total daily flow. The Manning equation is used to determine the instantaneous flow at outfall 002. One instantaneous flow measurement over a 24-hour period is not adequate to determine total daily flow. Continuous flow measuring devices should be permanently installed at least on the major process outfalls (settling basins A, B and C - outfalls 002, 003, and 010, respectively). The effluent structures from these three basins should be protected from high river stages so that flows can be measured continuously and to insure that the basins are not flooded.

Outfalls 001, 002, 003, 007 and 010 should be monitored at least once per week. If the No. 2 and 4 blast furnaces become operational, then outfalls 008 and 009 should also be monitored at least once per week. The minimum monitoring frequency for the remaining outfalls should be once per month.

III. MONITORING PROCEDURES

During the three-day monitoring period, only certain locations could be sampled to characterize wastewater sources and evaluate treatment units [Table 2]. Sampling locations were selected based on the representativeness of the wastewater and conditions which would not bias the data. Outfalls 002-006 and 008-010 were submerged or partially submerged precluding the collection of representative samples due to high river conditions. USSC reported that the effluents from settling basins A, B and C (outfalls 002, 003 and 010 respectively) were submerged for 48 days in 1975 and that the outfalls are affected by the river stage 13% of the time.¹ USSC has selected upsewer monitoring locations for outfalls 001, 004, 006 and 008, whenever the river stations are submerged. Alternate monitoring locations are not available for the other outfalls. The upsewer locations for outfalls 001, 004, and 008 are used for lithium chloride injection for flow determinations during normal river conditions; when the outfalls are submerged, samples are collected from these alternate locations and flows are not determined. During the reconnaissance in September 1975, USSC personnel were not certain if the wastewater sampled at the alternate sites was well mixed and contained the contributions from all sources. Although the plans of all the sewers were requested,² the information was not received by NEIC until after the survey. Therefore, due to the uncertainties, samples were not collected from the alternate locations.

Several of the National Plant's wastewater discharges flow into city combined sanitary-storm sewers [Table 1; Figs. 1, 2, 3]. According to the City of McKeesport officials, dry weather flow is intercepted by weir structures and diverted to the municipal treatment plant. Downsewer from the diversion weirs, only National Plant wastewaters enter the storm sewers. During wet weather, an undetermined amount of upsewer

Table 2
WASTEWATER MONITORING LOCATIONS
USSC NATIONAL PLANT
February 3-6, 1976

Station Description	Sample Type	Parameters
River Intake	Composite Grab	TSS, NH ₃ , CN, Metals Phenol, Settleable Solids, Organics, O/G
Intake Backwash	Grab	TSS, Settleable Solids
Outfall 001	Grab	TSS, O/G, Metals
Outfall 007	Grab	TSS, O/G, Metals
Thickener Influent and Effluent	Composite Grab	TSS, NH ₃ , CN Settleable Solids, Phenol, O/G
Blast Furnace Excess Cooling Water	Composite Grab	TSS, NH ₃ , CN, Metals Phenol, Settleable Solids, O/G

flow is not diverted but is discharged directly to the river. In January 1976, the Pittsburgh area experienced one of its heaviest recorded snowfalls; wet weather conditions continued during the survey. The samples might not have been characteristic of the steel mill discharges to the storm sewers; therefore the storm sewers were not monitored.

There are no permanently installed flow measurement devices on any of the National outfalls. USSC uses a tracer method to measure flow. Due to limited access to monitoring locations and safety considerations during the survey, the tracer method was judged by NEIC to be the best and maybe the only method for flow determination on a short-term basis. To use the tracer technique, at least two sewer access points must be available. The upstream location is used for tracer injection and the downstream point for sample collection and tracer analysis. Adequate mixing of the tracer must occur between the two access points. Since none of the outfalls except 001 had more than one upsewer access point, flows could not be measured by the tracer technique. Outfall 001 was reported to contain city water used for non-contact cooling; therefore, flow determinations were not considered warranted. A tracer could not be introduced into the thickener wastewater for flow measurement due to complete recycle of the wastewater. River intake volumes were determined from the USSC flow charts and gages.

Since flows were not determined, composite samples were collected on an equal-volume basis. Details on sampling procedures are contained in Appendix B. Chain of custody procedures [Appendix C] and analytical quality control procedures [Appendix D] were followed.

IV. MONITORING RESULTS

OUTFALL 001

The Locust Street storm sewer runs underneath the west side of the National Plant; the terminus of the sewer is outfall 001. The outfall is always submerged, therefore USSC monitors the wastewater in the storm sewer at a manhole located on the northeast corner of the Coupling Tap Building. According to USSC,¹ the only source of wastewater discharged from the National Plant to the storm sewer is cooling water from the air compressor in the Coupling Tap Building. The water is purchased from the City of McKeesport.

The sewer diagram for the seamless pipe mills (USSC drawing T-15842) shows many storm water inlets on USSC property connected to the Locust Street storm sewer. The drawing also shows the Blacksmith Shop, Boiler Shop and the Carpenter Shop connected to the Locust Street sewer upsewer of the USSC monitoring location. These connections may be floor drains.

The wastewater was grab-sampled at the manhole once per day for three days because USSC reported that only cooling water was being discharged. The TSS and oil/grease concentrations averaged 210 mg/l and 200 mg/l, respectively [Table 3]. Total iron concentrations averaged 6.7 mg/l. Although three grab samples are insufficient to characterize the wastewater stream, the samples do give an indication of the characteristics at the time of collection. These concentrations are not characteristic of cooling water. The source of the pollutants is not known by NEIC. The Locust Street storm sewer is 46 cm (18 in) in diameter at the monitoring location. The flow was estimated by NEIC personnel to be approximately 5 cm (2 in) deep. Although wet weather conditions were

Table 3

SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA

USSC NATIONAL PLANT - Mc KESPORT, PA.

February 3-6, 1976

Station Description	Date/Collection (hr)	Time of Collection (hr)	pH	Temperature (°C)	Gross Net	TSS	Settleable Solids	O/G	NH ₃ -N	Phenol	Total Cn (mg/l)	Total Fe	Dissolved Fe	Total Zn	Total Pb
River Intake	3	1450	8.8	2	G		<0.1	1		<0.005					
		1650	8.3	2	G		-	1		<0.005					
		2045	7.4	2	G		-	3		<0.005					
	4	Composite	7.4-9.1	1-2.5	G	11			0.26		0.01	1.60	0.21	0.064	<0.04
		0205	7.5	1.5	G							1.71	0.15	0.059	<0.04
		1510	7.9	3.0	G		<0.1	1		<0.005++					
		2025	7.8	1.5	G		-	1		<0.005++					
	5	Composite	7.3-7.9	1-3	G	8			0.30		0.02	1.49	0.19	0.045	<0.04
		0230	7.6	1.5	G			1		<0.005					
		1243	7.6	0.5	G		<0.1	2		<0.005					
		2025	7.7	1.5	G		-	1		<0.005					
	6	Composite	7.4-7.8	0-1.5	G	14			0.22		0.01	1.57	0.17	0.053	0.04
		0230	7.6	1.5	G			2		<0.005					
	3-Day Average														
					G	11	<0.1	1	0.26	<0.005	0.01	1.55	0.19	0.054	<0.04
River Intake Screen Backwash	3	1447	8.8	2.5	G	13	<0.1								
	4	1505	7.7	3.0	G	6	<0.1								
	5	1440	7.4	4.0	G	10	<0.1								
	3-Day Average														
					G	10	<0.1								
Outfall 001	3	1540	8.8	39.0	G	200		170				5.1	<0.05		
	4	1550	7.7	35.5	G	290+++		280				5.9	<0.05		
	5	1530	7.2	31.0	G	140		150				9.2	<0.05		
	3-Day Average														
					G	210		200				6.7	<0.05		
Outfall 007	3	1515	10.2	75	G	26		1				0.29	<0.05		
	4	1525	11.0	78	G	110		1				0.33	<0.05		
	5	1500	11.0	58	G	56		<1				0.50	<0.05		
	3-Day Average														
					G	64		<1				0.37	<0.05		

Table 3 (Continued)
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA

Station Description	Date/Collection (Feb.)	Time of Collection (hr)	pH	Temperature (°C)	Gross Net	TSS	Settleable Solids	O/G	NH ₃ -N	Phenol (mg/l)	Total Cu	Total Fe	Dissolved Fe	Total Zn	Total Pb
Outfall 007 (Continued)	3	1515			N	15		<1				<0.05	<0.05		
	4	1525			N	100		<1				<0.05	<0.05		
	5	1500			N	42		<1				<0.05	<0.05		
	3-Day Average				N	52		<1				<0.05	<0.05		
Ferromanganese Thickener Influent	3	1420	9.0	63	G		2.0								
	4	Composite	9-9.7	61-65	G	2,400			77	0.30	1,300				
		0235	9.7	65	G			1		0.31					
		0435	9.6	64	G			3							
		0615	9.1	66	G			1							
		0810	9.3	61	G			1							
		1014	9.4	65	G			1							
		1210	9.3	65	G			1							
		1425	8.8	66	G		2.5	2		0.49++					
		1625	9.2	64	G					0.58++					
		1845	9.6	64	G					0.53++					
	5	Composite	9.1-9.6	60-66	G	720			82	0.55	1,100	85			
Ferromanganese Thickener Effluent	3	Composite	9.1-9.6	60-66	G					0.57					
		0210	9.3	64.5	G			3							
		0430	9.3	60	G			1							
		0610	9.3	62	G			1							
		0807	9.4	62	G			1							
		1415	9.5	62	G		7.5								
		1820	9.0	64	G					0.68					
	6	Composite	9-9.6	60-66	G	820			78	0.68	1,100	78			
		0010	9.6	64.5	G					0.71					
		0210	9.3	62.5	G										
		0435	9.1	64	G										
	3-Day Average					1,300	4	2	79	0.54	1,170	83			
Ferromanganese Thickener Effluent	3	1425	9.1	54	G		0.1								
	4	Composite	9-9.7	52-56	G	750			91	0.31	1,200				
		0245	9.7	55	G			3		0.34					
		0445	9.6	55	G			2							
		0630	9.4	57	G			1							
		0815	9.2	56	G			3							
		1020	9.3	56	G			2							
		1215	9.1	56	G		0.4								
		1435	7.6	51	G					0.46++					
		1635	9.4	53	G					0.47++					
		1850	9.5	55	G					0.56++					

Table 3 (Continued)

SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA

Station Description	Date/Collection (Feb.)	Time of Collection (hr)	pH	Temperature (°C)	Gross/Net	TSS	Settleable Solids	O/G	NH ₃ -N	Phenol	Total (mg/l)			
											Total Cn	Total Fe	Dissolved Fe	Total Zn
Ferromanganese Thickener Effluent (Continued)	5	Composite	7.6-9.5	51-57	G	480			87		1,000	89		
		0220	9.4	51	G					0.55				
		0435	9.3	54	G			1		0.57				
		0615	9.2	53	G			1						
		1418	9.5	52	G		0.1							
6	6	Composite	9-9.5	52-56.5	G	520		1		0.60				
		0220	9.3	55	G				86	0.68	900	88		
		0220	9.0	54	G			3		0.68		92		
		0420	9.4	55	G									
		3-Day Average			G	580	0.2	2	88	0.47	1,050	89		
Excess Cooling Water, Ferromanganese Blast Furnace	3	1440	8.3	7.5	G		<0.1	2		<0.005				
		1658	8.5	8.0	G			2		<0.005				
		2100	7.2	6.5	G			2		<0.005				
		Composite	7.2-8.9	6-8.5	G	16		1		<0.005	0.10	1.69	0.18	
		0215	7.5	7.0	G		<0.1	<1		<0.005				
5	5	Composite	7.2-8.9	6-8.5	G			1		<0.005				
		0245	7.3	6.5	G	11		1		<0.005	0.05	1.60	0.10	
		1455	7.7	9.0	G		<0.1	1		<0.05				
		2040	7.3	6.0	G			2		<0.05				
		3-Day Average			G	21		1	0.58	<0.005	0.05	2.25	<0.05	
6	6	Composite	7.1-7.9	6-7.5	G			1						
		0245	7.5	6.5	G									
		3-Day Average			G	16	<0.1	1	0.58	<0.005	0.07	1.85	<0.11	
		1440			N		<0.1	1		0				
		1658			N			1		0				
		2100			N			0		0				

Table 3 (Continued)
SUMMARY OF FIELD MEASUREMENTS AND ANALYTICAL DATA

Station Description	Date (Feb.)	Time of Collection (hr)	pH	Temperature (°C)	Gross Net	TSS	Settleable Solids	O/G	NH ₃ -N	Phenol	Total Cu (mg/l)	Total Fe	Dissolved Fe	Total Zn	Total Pb
Excess Cooling Water, Ferro-Manganese Blast Furnace (Continued)	4	Composite			N	5		<1		<0.005	0.09	0.09	<0.05		
		0215			N			<1		<0.005					
		1455			N		<0.1	<1		<0.005					
		2040			N			<1		<0.005					
	5	Composite			N	3		<1		<0.005	0.03	0.21	<0.05		
		0245			N			<1		<0.005					
		1455			N		<0.1	<1		<0.005					
		2040			N			1		<0.005					
	6	Composite			N	7		<1	0.36		0.04	0.68	<0.05		
		0245			N										
3-Day Average					N	5	<0.1	<1		<0.005	0.06	0.33	<0.05		

+All composite samples collected between 6 a.m. and 6 a.m.; date is the day the sample was composited (i.e., 24-hour composite 0600 Feb. 3 to 0600 Feb. 4 is dated Feb. 4). All composite samples were combined on an equal-volume basis.
 ++Samples analyzed after recommended holding time because air freight personnel in Pittsburgh, Pa., did not place samples on the scheduled flight to Denver.
 Data represent minimum values due to possible deterioration.
 +++Value statistically out of the quality control limits of analysis. Aliquots of the sample may not have been representative due to high solids concentration in sample. Value is a minimum value.

prevalent prior to and during the survey, the depth of flow was not indicative of a wet weather discharge. As previously discussed, dry weather flow upsewer of the National Plant is diverted to the McKeesport wastewater treatment plant. Therefore the pollutants were probably discharged from the National Plant. High concentrations of iron on all three days indicate that process wastewaters were being discharged.

Because the NPDES permit only requires monitoring of temperature and pH and an estimation of flow, the survey data cannot be compared with recent USSC monitoring data. The quantity of cooling water discharged from outfall 001 for July 1974-July 1975 is summarized in Table 4.

USSC has not proposed effluent limitations for this discharge.

The monitoring location is at the last access point to the storm sewer below all USSC connections, except one, according to USSC drawing T-15842. There is a connection directly into the manhole, about 1.8 m (6 ft) above the storm sewer invert, which apparently contains storm water runoff. Contributions from this source would influence samples collected for self-monitoring purposes. However, if runoff is not occurring, the monitoring site is satisfactory if flows can be adequately measured.

Flows can be measured using the tracer technique or by installing permanent flow devices. Because the sewer contains storm waters, the permanent structure should not obstruct the flow. A flume and stage recorder could be installed to provide continuous flow data. If the tracer method is used, the injection location should be evaluated. Currently USSC injects a lithium chloride solution in the manhole approximately 30 m (100 ft) upsewer of the monitoring location. Samples should be collected from the sewer cross-section to determine if adequate mixing occurs. If the tracer is not evenly dispersed, then the tracer should be injected at another location further upsewer, possibly at the

Table 4

COOLING WATER DISCHARGED FROM OUTFALL 001†
USSC NATIONAL PLANT
JULY 1974-JULY 1975

Month	Cooling Water Discharged Per Month	
	m ³ ††	Gallons
July, 1974	9,725	2,569,380
August	9,315	2,460,920
September	7,885	2,083,180
October	10,330	2,729,642
November	8,645	2,283,644
December	10,060	2,658,392
January, 1975	8,900	2,350,696
February	8,020	2,118,336
March	8,030	2,122,076
April	10,305	2,722,720
May	8,900	2,350,452
June	7,830	2,068,968
July	9,330	2,464,660
Monthly Average	9,020	2,383,313

† Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Mr. Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.

†† Calculated by NEIC.

air compressor, and the mixing should then be re-evaluated. Due to the low flows and short distance between current injection and sampling sites, the possibility exists that mixing will not be complete.

OUTFALL 002

Process wastewaters from the No. 1 and 2 seamless mills are discharged to a central sewer which drains east to west under the mills. The process wastewaters may flow to outfall 002 or 003; however, most of the flow from outfall 002 originates in the No. 1 seamless mill. Outfall 002 also receives process wastewaters from the Arc Weld Mill, electroplating and painting of couplings, and the quench and temper line. There are 13 scale pits located throughout the No. 1 seamless mill to remove coarse particles from the first and second piercers, high mill reelers, sizing mill and four cooling tables. Twenty-seven scale pits serve various operations in the No. 2 seamless mill. Each of the 40 scale pits contains a removable bucket which is emptied when full.

All of the wastewaters flow to settling basin A, located on the bank of the Monongahela River. The effluent from the basin is outfall 002. The effective dimensions of basin A are 30 m long x 6 m wide x 4 m SWD* (100 x 20 x 13.5 ft) (USSC drawings T-118731 and T-118733).¹ The maximum detention time reported by USSC is 58 minutes.¹ The basin has a single inlet located approximately 5.4 m (17.8 ft) above the bottom of the basin. There are no bypass provisions. [A sketch of the basin is included in Appendix A.]

The effluent launder was submerged during the NEIC survey; therefore the discharge from outfall 002 could not be monitored. Because the

* Side water depth

effluent weir was submerged and the entire settling basin flooded, treatment of the wastewater was minimal.

Self-monitoring data for January-October 1975 [Table 5] indicate that the influent flow ranged from 14,000 to 29,000 m³/day (3.7 to 7.7 mgd). The average daily flow is approximately 18,900 m³/day (5 mgd).¹ The net TSS and O/G loads discharged ranged from 0 to 1,334 kg (2,941 lb)/day and 0 to 773 kg (1,705 lb)/day, respectively. The data reported is a rough estimate of the effluent characteristics because all samples are collected on a grab basis. The flows reported are instantaneous values measured for five minutes on the monitoring day; therefore the loads reported are only indicative of conditions for a short time period.

USSC does not have data on the treatment efficiency of basin A. However, for calendar year 1975, the amount of oil skimmed from the basin is summarized in Table 6 and the quantity of scale removed from all three settling basins is summarized in Table 7.¹

USSC has proposed gross effluent limitations for TSS and O/G for outfall 002 [Table 8]. For an average flow of 18,900 m³/day (5 mgd) reported by USSC, proposed TSS load limitations would be exceeded when the average daily TSS concentration was greater than approximately 75 mg/l. Proposed daily maximum load limitations for TSS and O/G would be exceeded when concentrations were greater than 225 mg/l and 190 mg/l, respectively. During the NEIC survey, the intake TSS and O/G concentrations averaged 11 mg/l and 1 mg/l, respectively. The maximum TSS concentration reported for January-October 1975 was 117 mg/l. The maximum O/G concentration for the same period was 60 mg/l. Therefore, it appears that the proposed limitations are not realistic for discharge conditions. Furthermore, the TSS parameter should be limited on a net basis. Because O/G samples are collected on a grab basis, the limitations should be on a gross basis since these samples cannot be composited.

Table 5

SUMMARY OF SELF-MONITORING DATA*
USSC NATIONAL PLANT
JANUARY-OCTOBER, 1975

LOCATION	PARAMETER (RANGE)	MONTH									
		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
Intake	Flow, mgd	NR**	48.6-59.2	61.5-70	47.5-61.2	57.7-61.3	52.7-58.9	44.5-47.5	50.4-87.7	55.6-83.7	47.9-59.5
	TSS, mg/l	NR	24-56	39-52	2-15	12-35	15-45	3-13	1-16	5-136	9-40
	O/G, mg/l	NR	0.3-2.8	0.0-8.5	0.2-4.9	2.3-24.6	0.4-3.9	0.4-9.0	0.8-17.8	0.1-3.8	0.1-7.9
Outfall 001	Flow, mgd	NR	NR	0.12+	NR	NR	0.06+	NR	NR	0.1+	NR
	TSS, mg/l	4.8+	4.8+	3.7-5.3	4.4-5.2	4.8-6.1	5.3-7.7	4.8-6.5	4.3-5.7	4.2-5.3	4.8-6.6
	O/G, lb/day++	NR	36-45	68-93	23-72	10-41	34-49	22-52	10-82	21-52	15-117
Outfall 002	Flow, mgd	NR	0-1,369	494-1,711	911-2,092	0-1,017	0-2,119	525-2,158	426-2,941	0-875	NR
	TSS, lb/day++	NR	5.7-22.5	5.1-26.7	6.9-28.9	6.2-50.7	5.3-15.2	5.0-29.8	2.5-38	4.4-60.2	0.1-18.9
	O/G, lb/day++	112-528	232-524	203-600	286-556	0-1,680	242-509	242-1,705	129-890	250-1,130	NR
Outfall 003	Flow, mgd	5.7+	5.7+	5.7+	5.7+	5.3+	1.57+	4.4-5.2	3.5-4.9	3.8-6.6	3.9-12.2
	TSS, mg/l	NR	15-96	42-75	NR	23-59	15-54	12-27	10-36	19-107	10-45
	O/G, lb/day++	85-1,730	0-1,901	95-1,188	285-1,283	0-1,105	0-498	0-824	0-1,096	725-1,543	NR
Outfall 004	Flow, mgd	1.2+	1.2+	1.2+	1.2+	NR	4.5+	6.5-9.8	8.5+	1.2+	1.2+
	TSS, mg/l	NR	8.7-22.5	0-19.9	NR	5.5-28.2	7.6-21.6	7.6-31.1	2.5-38	7.8-28.5	1.2-18.3
	O/G, lb/day++	0-294	275-623	124-375	442-675	0-552	126-164	0-656	0-444	335-946	NR
Outfall 005	Flow, mgd	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	TSS, mg/l	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	O/G, lb/day++	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Outfall 006	Flow, mgd	NR	NR	NR	NR	NR	0.6-1.7	NR	NR	0.6-1.7	NR
	TSS, mg/l	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	O/G, lb/day++	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Outfall 007	Flow, mgd	0.3+	0.3+	0.35+	0.37+	0-35+	0.24+	0.26-0.27	0.26-0.27	0.26-0.26	0.95+
	TSS, mg/l	NR	71+	88-124	124+	68+	21+	114+	34+	44+	74+
	O/G, lb/day++	55+	113+	1,276-1,833	0-225	0-158	0-12	0-224	0-74	0-31	NR
Outfall 008	Flow, mgd	7.9+	7.9+	7.9+	17.9+	10.8-17.9	14.3+	13.7-19.3	13.7-19.3	7.9	7.9
	TSS, mg/l	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	O/G, lb/day++	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

Table 5 (Continued)

SUMMARY OF SELF-MONITORING DATA^a

LOCATION	PARAMETER (RANGE)	MONTH									
		JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
Outfall 009 Flow, mgd		2.3†	5.0†	6†	16†	5.2†	8.8†	5.4-8.1	6.5†	5.2†	
		5.9†	5.9†	5.9†	5.9†	13.1†	11.2†	7.2-11.6	7.5-11.8	8.5-13.8	8.8-15
	TSS, mg/l	NR	77-96	60-110	18-950	27-36	27-44	11-27	1-30	9-109	16-54
	TSS, lb/day††	0-10,620	1,468-3,329	979-2,839	787-46,500	0-2,403	0-2,719	0-1,454	0-1,305	0-365	NR
	O/G, mg/l	NR	3.4-23	2.6-26.9	1.4-92.8	1.7-25.2	1.2-12.8	0.7-7.4	0.8-9.9	2.1-7.0	0.8-22.7
Outfall 010 Flow, mgd	O/G, lb/day††	44-1,155	83-2,560	39-372	221-1,653	0-284	112-562	15-218	0-231	71-456	NR
	CN, mg/l	NR	NR	0.4-0.9	0.03-0.3	0.003-0.02	NR	0.02-0.05	0.01-0.05	0.01-0.02	0.01-0.03
		0-0.7	0.1-0.34	0.2-4.1	0-9.9	0-0	0-0.7	0.15-2.9	0-2.6	0-0.23	NR
	CN, lb/day††										

^aData taken from the Discharge Monitoring Reports submitted by USSC to EPA, Region III, for January-September, 1976 and from letter dated January 28, 1978 from J. L. Hamilton, Manager, Environmental Control-Acter, USSC, to Mr. Stephen B. Wassersug, Director, Enforcement Division, U.S. EPA, Region III, (USSC's response to EPA 308 Request of November 17, 1976). All data reported as gross values unless indicated as net.

^bNR - Not reported in either document cited above.

^cOne value reported.

^dNet value.

^e††Data not determined.

Table 6
OIL SKIMMED FROM SETTLING BASINS[†]
USSC NATIONAL PLANT
1975

Month	Basin					
	A		B		C	
	m ³	Gallons	m ³	Gallons	m ³	Gallons
January	8.0	2,100	8.0	1,900	10.0	2,640
February	5.3	1,400	8.1	2,140	12.5	3,300
March	10.1	2,600	7.6	2,000	11.1	2,920
April	8.3	2,180	7.6	2,000	7.7	2,040
May	4.6	1,220	7.3	1,920	10.8	2,840
June		††		††		††
July	12.0	3,180	9.3	2,460	17.1	4,520
August	5.2	1,380	5.4	1,420	10.0	2,640
September	5.0	1,320	4.9	1,300	9.3	2,450
October	4.4	1,160	4.8	1,260	8.5	2,240
November	3.8	1,000	4.2	1,120	7.7	2,040
December	5.5	1,440	6.7	1,760	10.5	2,760

† Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.

†† Data not available

Table 7

SCALE RECOVERED FROM SETTLING BASINS[†]
USSC NATIONAL PLANT
1975

Dredging Date	Scale Recovered Basins A+B+C	
	m. tons	tons
3-3-75	287	316.5
3-29	422	465
4-27	327	360
6-29	397	438
8-3	389	429
8-27	262	289
10-5	518	571
10-27	270	298
12-1	457	504
12-27	484	534

[†] Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.

Table 8

PROPOSED EFFLUENT LIMITATIONS†
USSC NATIONAL PLANT

Outfall No.	Parameter††	Gross Net	Discharge Limitations			
			Daily Average		Daily Maximum	
			kg/day	lb/day	kg/day	lb/day
					Daily Average (Unit Specified)	Daily Maximum
002	TSS	G	1,455	3,200	4,365	9,600
	O/G	G	NA	NA	3,641	8,010
003	TSS	G	901	2,050	2,793	6,150
	O/G	G	685	1,506	2,055	4,518
007	TSS	N	328	721	984	2,163
010	TSS	N	2,413	5,310	7,239	15,930
	O/G	G	NA	NA	4,023	8,850
	CK (Total)	G	NA	NA	NA	NA

† Amended request for Adjudicatory Hearing.

†† Flow and temperature parameters were listed as NA for all limitations. pH was proposed as 6.0 minimum and NA maximum.

USSC monitors outfall 002 at the effluent from the basin. The monitoring location is only satisfactory when the effluent launder is above the river level.

The wastewater flow from outfall 002 is determined at the influent to basin A from the Manning equation

$$Q = A (1.49/n) R^{2/3} S^{1/2}$$

where

Q = flow

A = cross-sectional area of flow

R = hydraulic radius

S = slope of the energy gradient (slope of
the flow channel)

n = Manning coefficient

USSC assumes that the slope of the sewer as installed is the same as the design slope, 0.0059 ft/ft. The Manning coefficient used, $n = 0.13$, is typical of ordinary concrete pipe. The cross-sectional area and hydraulic radius are computed for various depths of flow. This method of computing flow is satisfactory, provided that the USSC assumptions are correct for S and n. Because USSC has the capability to measure flow by the tracer technique, flows should be determined by both methods and the Manning equation coefficients should be verified. A correction factor, if required, could be derived for various flows to allow use of the equation for self-monitoring purposes. A continuous-recording stage recorder could be installed in the influent pipe to provide daily flows.

OUTFALL 003

The Huey Street storm sewer runs beneath the seamless mills and discharges into settling basin B [Fig. 1]. The effluent from the basin

is outfall 003. Process wastewaters from the No. 2 seamless mill are discharged to basin B, although the wastewaters from the No. 1 seamless mill may also be discharged to basin B since both mills discharge to the central sewer beneath both of the mills.

The effective dimensions of settling basin B are 30 m long x 6 m wide x 4.6 m SWD (100 x 20 x 15 ft) (USSC drawings T118745 and T118746).¹ The maximum detention time reported by USSC is 48 minutes. The basin's single inlet is below the effluent weir elevation; therefore the inlet is always submerged. The basin cannot be bypassed. A sketch of the basin is included in Appendix A.

The effluent launder, positioned at the same elevation as the launders in basins A and C, was submerged during the NEIC survey. Treatment during high river conditions would be minimal.

The self-monitoring data for January-October, 1975 [Table 5] show that the flow ranged from 5,900 to 46,200 m³/day (1.6 to 12.2 mgd). The daily flow, reported by USSC, averages 22,700 m³ (6 x 10⁶ gal).¹ The net TSS and O/G loads discharged ranged from 0 to 860 kg/day (1,901 lb/day) and 0 to 430 kg/day (946 lb/day), respectively. As previously discussed, samples are collected on a grab basis and daily flows are estimated from an instantaneous flow determined with a lithium chloride solution; therefore the data reported was USSC's estimate of the effluent characteristics.

Since the influent to the basin is submerged, the treatment efficiency of basin B cannot be determined. However, the amounts of O/G and scale removed from the basin are summarized in Tables 6 and 7, respectively, for the 1975 calendar year.

USSC has proposed gross effluent limitations for TSS and O/G for outfall 003 [Table 8]. Based on the average flow of 22,700 m³/day (6 mgd) reported by USSC, the average daily TSS and O/G concentrations

would be approximately 40 mg/l and 30 mg/l, respectively. Since intake concentrations of TSS average 11 mg/l and O/G average 1 mg/l during the NEIC survey, approximately 30 mg/l of TSS and 29 mg/l of O/G could have been added from processes to the intake water. On a daily maximum basis, the TSS and O/G concentrations would be 120 mg/l and 90 mg/l, respectively. The maximum TSS and O/G concentrations for January-October, 1975 were 107 mg/l and 38 mg/l, respectively. The TSS and O/G limits submitted by USSC appear to have been proposed at levels that would be rarely exceeded. The TSS samples should be collected on a composite basis over 24 hours and net limitations applied. O/G should be limited on a gross basis since grab samples are collected.

USSC samples outfall 003 at the effluent from the basin. This location is only satisfactory when the effluent launder is above the river level.

The wastewater flow is measured with a lithium chloride solution over a 5-minute period. The maximum instantaneous flow calculated over this period is used to estimate the daily flow. The lithium chloride solution is injected upstream of the settling basin; samples of the basin's influent are collected from the upwelling zone in the basin and analyzed for lithium for computation of the flow. This method of flow measurement is not acceptable and is not dependable because of dilution of the lithium with the wastewater in the basin, the build-up of lithium in the upwelling zone over the 5-minute injection period, and the dispersal or diffusion characteristics within the upwelling zone. The flow should be measured on a continuous basis and recorded daily. This would require the installation of a permanent flow measurement device upsewer of the basin where all wastewaters are present, or at the effluent launder. The latter would require the construction of a protective structure to prevent the river from backing up into the basin during high water conditions. The protective structure should be installed to protect the basin regardless of whether the flow is measured at the effluent.

OUTFALL 004

Cooling waters from four of the five air compressors in the booster pumping station and the air compressors in the powerhouse are discharged from outfall 004. The cooling water from the fifth air compressor is discharged from outfall 005. The cooling water in the reservoir serving the barometric condenser in the powerhouse is pumped to outfall 005. The overflow from the reservoir may be discharged from outfall 004 according to USSC personnel during the reconnaissance.

USSC also reported during the reconnaissance that the Armstrong Street storm sewer connects to the 004 sewer, however USSC has not been able to locate the storm sewer on their property even though it is indicated on USSC drawing T-15842. However, McKeesport Wastewater Treatment Plant personnel are not aware of an Armstrong Street storm sewer nor is it indicated on their sewer maps. Therefore, the discharge from outfall 004 probably consists entirely of USSC's flow.

During the survey, the outfall was submerged and monitoring was not conducted. USSC personnel stated that when outfall 004 is submerged, the discharge is sampled at the upstream manhole on the northwest side of the pumphouse, where the lithium chloride solution is injected for flow determinations. According to USSC drawing T-15842, three sewer lines enter the manhole. The possibility exists that the wastewater is not completely mixed at this location and therefore does not represent an acceptable sampling site for TSS, O/G, iron and other pollutant parameters. The location is adequate for tracer injection for flow work, provided that mixing occurs in the pipe before discharge to the river.

USSC has not proposed effluent limitations for this outfall.

The NPDES permit only requires monitoring of pH, temperature and flow. In the self-monitoring data, USSC reported flow ranging from

4,540 to 37,100 m³/day (1.2 to 9.8 mgd) [Table 5]. The daily flow averages 30,300 m³ (8 x 10⁶ gal).¹

The monitoring location is adequate only when the outfall is not submerged or partially submerged.

Flow measurements by the tracer technique are acceptable, however, more than one measurement per day should be made to characterize the fluctuations and determine the total daily flow.

OUTFALL 005

Cooling waters from the 10,000 kW turbine generator barometric condenser and the air compressor in the booster pump station discharge intermittently from outfall 005. During the survey, the outfall was submerged.

USSC did not submit data for this outfall for January-October, 1975 [Table 5]. The NPDES permit requires quarterly monitoring of this outfall. The quantity of condensing water used by the 10,000 kW turbine generator is summarized in Table 9. On a quarterly basis, the discharge from outfall 005 should be monitored in March, June, September and December. Although there were discharges in three of these four months in 1975, USSC personnel reported that the discharges did not occur on monitoring days. Since the NPDES permit requires monitoring and does not specify the day, USSC personnel should monitor the wastewater even though the discharge occurs on non-monitoring days.

USSC determines flow by injecting a lithium chloride solution into an upsewer manhole. USSC estimates the flow to be approximately 1,900 m³/day (0.5 mgd).¹

USSC has not proposed effluent limitations for this outfall.

Table 9

PERIOD OF OPERATION AND CONDENSING WATER USAGE[†]
10,000 KW TURBINE GENERATOR
USSC NATIONAL PLANT
1975

Month	Total Hours Operation	Condensing Water	
		m ³ X 10 ³ ^{††}	Gallons X 10 ³
January	0	0	0
February	161	380	100,193
March	164	385	101,613
April	294.75	700	184,890
May	246	690	182,155
June	69.2	350	93,042
July	152.50	550	144,524
August	415.50	110	287,157
September	186.25	630	165,684
October	0	0	0
November	0	0	0
December	0	0	0

- † Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control-Water, USSC, to Mr. Stephen R. Wasseraug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.
- †† Calculated from USSC data.

The monitoring location at the river is adequate only when the river level is below the outfall.

OUTFALL 006

Spent cooling water from the boiler house and blowdown from the water treatment plant is discharged from outfall 006. Water treatment consists of hot lime-soda ash softening and filtering. There are 3 lime-soda ash reaction tanks (1 used as a spare), 14 pressure filters, 3 chemical feeders and 1 set of acid feed equipment for pH control. Each reaction tank can continuously deliver $300 \text{ m}^3/\text{hr}$ (80,000 gph) and are blown down once per day. The treated water is routed to the boiler house for use as boiler feed water.

During the reconnaissance, USSC personnel were not certain whether or not the Martin Street storm sewer intercepted the flow to outfall 006. USSC drawing M-33461 does not show that the 006 flow is diverted to the storm sewer.

During the survey, the outfall was submerged and samples were not collected. USSC normally samples at the river location. If cooling water is the only wastewater discharged from the outfall as reported by USSC, the flow can be sampled from the first upsewer manhole between the 110-inch mill and the boiler house if pH and temperature are the only parameters to be monitored. The river location is adequate for monitoring when the outfall is not submerged.

For January-October 1975, USSC estimated* the flow to range from 2,300 to $6,400 \text{ m}^3/\text{day}$ (0.6 to 1.7 mgd). During the reconnaissance, it

* *Lithium chloride tracer method*

was estimated by USSC that the flow averaged 2,800 m³/day (0.75 mgd), but it could also exceed 18,900 m³/day (5 mgd); this was confirmed by USSC on January 28, 1976.¹

USSC has not proposed effluent limitations for this outfall.

OUTFALL 007

Outfall 007 contains blowdown water from the blower house and the sludges from the hot lime-soda ash process and filter backwashes. For January-October 1975, USSC estimated the flow to range from 900 to 3,600 m³/day (0.24 to 0.95 mgd) [Table 5]. The net TSS load discharge ranged from 0 to 830 kg/day (1,833 lb/day). The maximum TSS concentration reported was 124 mg/l.

Since the outfall was above the river, grab samples were collected once per day for three days to confirm that process wastes were not being discharged [Table 3]. The net increase in TSS averaged 53 mg/l; there was no net increase in O/G, total or dissolved iron concentrations. The pH was above 10.2 on all three days. The wastewater was characteristic of boiler blowdown water.

USSC has proposed effluent limitations for TSS on a net basis [Table 8]. Based on the average flow of 3,800 m³/day (1 mgd) reported by USSC,¹ the net average TSS load* discharged during the survey would have been 200 kg/day (440 lb/day); the daily maximum net TSS load* would have been 385 kg/day (850 lb/day). These average and maximum loads are only 60% and 39%, respectively, of the proposed limitations.

* Assuming that the TSS concentrations remained constant in the effluent over the 24-hr period.

Gross limitations should be applied at outfall 007 because the boiler water has been treated and filtered (see outfall 006). Therefore the pollutants in the discharge would not be related to intake water parameters. In addition, the sludges and filter backwashes cannot receive credit for intake levels.

Flows are estimated from lithium chloride measurements. The tracer is added through a cover grate in the manhole on the east side of the boiler house. Because steam is present in the manhole, neither USSC personnel or EPA personnel were able to see the bottom of the manhole during the reconnaissance or the survey. In addition, the cover cannot be removed without breaking the concrete in which it is imbedded. Therefore, during injection, it cannot be observed if all of the solution is added to the wastewater flow or if the solution is adsorbed to the manhole sides. If some of the solution is adsorbed, the flow will be calculated greater than actual conditions.

The monitoring location at the river is satisfactory.

OUTFALLS 008 and 009

The No. 2 and 4 blast furnaces and associated Dorr thickeners are no longer operational, and the wastewater in the No. 1 blast furnace Eimco thickener is recycled; the flows from these units previously were discharged from outfalls 008 and 009. Cooling waters from the No. 1 blast furnace are discharged from outfall 009 and are also used as barometric condenser makeup water in the blow house. Additional water is also supplied to the blow house condenser. The steam condensate from the condenser is discharged from outfall 008. Process effluents from the bar mill hot saws are also discharged from outfall 009. The terminus of the White Street storm sewer is outfall 009.

During the survey, both outfalls were submerged; there are no alternate monitoring locations.

The NPDES permit requires monitoring for flow, pH and temperature. The flows from outfall 008 ranged from 29,900 to 73,000 m³/day (7.9 to 19.3 mgd) for January-October 1975 [Table 5]. The flows from outfall 009 ranged from 8,700 to 60,500 m³/day (2.3 to 16 mgd) for the same period. USSC estimated that the flows from outfalls 008 and 009 average 45,400 (12 mgd) and 38,000 m³/day (10 mgd), respectively.¹

USSC has not proposed effluent limitations for either outfall.

Flows are measured instantaneously with a lithium chloride tracer, over a 5-minute period. Although the technique is satisfactory, it can be used only when the outfalls are not submerged. Due to the large fluctuations in the daily flows in each outfall, a single flow measurement is not sufficient to characterize the total flow.

Monitoring at the river location is satisfactory only when the outfalls are not submerged.

If the No. 2 and 4 blast furnaces become operational, then process wastewaters from the Dorr thickeners will be discharged from outfall 008 and 009 and continuous flow measurement and frequent effluent monitoring should be required for both outfalls.

OUTFALL 010

The effluents from the sinter plant, two bloom mills and the bar mill are discharged to settling basin C, located on the bank of the Monongahela River. The effluent from the basin is outfall 010. Each bloom mill is served by a scale pit while the 32-inch bar mill has a centrally located scale pit followed by a smaller discharge scale pit.

The effective dimensions of settling basin C are 30 m long x 6 m wide x 4.5 m SWD (100 x 20 x 15 ft) (USSC drawings M-52003 and M-52004). The maximum detention time reported by USSC is 24 minutes.¹ The basin has two influent pipes; the invert elevation of the 1.2 m (4 ft) diameter pipe is the same as the crest elevation of the effluent weir on the launder. The 76 cm (30 in) diameter pipe is submerged in the basin. There are no bypass facilities for the basin.

The effluent launder was submerged during the survey as were the two inlet pipes. Because of the influence of the river "backing up" into the basin, treatment of the wastewater was minimal.

Self-monitoring data for January-October 1975 [Table 5] indicate that the discharge flow ranged from 22,300 to 56,800 m³/day (5.9 to 15 mgd). The average daily flow is 45,400 m³ (12 x 10⁶ gal).¹ The net TSS and O/G loads discharged ranged from 0 to 4,817 kg/day (10,620 lb/day) and from 0 to 1,161 kg/day (2,560 lb/day). Cyanide net loads ranged from 0 to 4.4 kg/day (9.9 lb/day). The maximum cyanide concentration reported was 0.9 mg/l.

USSC does not have data on treatment efficiency; however, the total quantities of oil and scale skimmed from the basin are summarized in Tables 6 and 7, respectively.

USSC has proposed effluent limitations on a net basis for TSS and on a gross basis for O/G for this outfall. Limitations for total cyanide were proposed as NA (not applicable). Based on the average flow of 45,400 m³/day (12 mgd), the net daily average and maximum TSS concentrations would be about 50 mg/l and 150 mg/l, respectively. The maximum gross O/G concentration would be 90 mg/l. The maximum net TSS load reported for January-October 1975 was 4,817 kg (10,820 lb)/day, which was 67% of the proposed limitation. O/G loads over the same period were reported on a net basis. However, the maximum concentration reported was 93 mg/l, which exceeded the proposed maximum concentration.

USSC monitors outfall 010 at the effluent from the basin. The monitoring location is only satisfactory when the effluent launder is above the level of the river. There are no alternative monitoring locations.

According to USSC, the flows are estimated using the lithium chloride tracer technique. A flow measuring and recording device should be permanently installed at the effluent channel; a protective structure would be required to prevent the river from backing up into the basin.

NO. 1 BLAST FURNACE THICKENER

The No. 1 blast furnace has a rated capacity of 950 m. tons (1,047 tons)/day of basic iron and 345 m. tons (381 tons)/day of ferromanganese (FeMn).¹ The blast furnace has been converted to FeMn production and is the primary producer of FeMn for USSC. Cooling water from the blast furnace is used as makeup water for the barometric condenser in the blow house. Excess cooling water is discharged from outfall 009. The blast furnace is equipped with a dry dust catcher followed by a venturi scrubber and cooling tower. The scrub effluents are treated in a 33.5 m (110 ft) diameter Eimco thickener and then are recycled back to the venturi scrubber and cooling tower. Underflows from the thickener are vacuum filtered; the filtercake is landfilled and the filtrate returned to the thickener. According to USSC, there is no blowdown from the system.¹ Makeup water is added in quantities equivalent to the losses from evaporation and solids removal. The system removes solids and other pollutants contained in the solids particles. Additional treatment for cyanide, phenol, metals, etc. removal is not provided.

During the NEIC survey, the blast furnace was operating at the following levels:³

Date (Feb.)	Blast Furnace (Hot Metal Tons)		Rated Capacity (%)
	m. tons/day	tons/day	
3	379	418 (High Carbon FeMn)	110
4	364	401	105
5	330	364	96
6	376	414	109
		Average	105

For 1975, the production levels were as follows:¹

Parameter	Weekly Basis (net tons/day)					
	Maximum		Minimum		Average	
	m.tons	tons	m.tons	tons	m.tons	tons
Basic iron	1,282	1,414	1,050	1,157	1,122	1,237
FeMn	399	440	240	264	335	369

Parameter	Monthly Basis (net tons/day)					
	Maximum		Minimum		Average	
	m.tons	tons	m.tons	tons	m.tons	tons
Basic iron	1,165	1,284	1,083	1,194	1,118	1,232
FeMn	700	772	493	543	643	709

The influent and effluent of the thickener were monitored for three days to determine treatment characteristics. Flows could not be measured because any tracer introduced into the influent would be recycled and the accumulative effect would yield erroneous flows. Therefore, TSS, ammonia, total cyanide and total iron samples were composited on an equal-volume basis. The flow through the thickener was assumed to remain constant. However, because flows were not measured, the data represents an estimate of the thickener's performance. Samples for O/G, settleable solids and phenol were collected on a grab basis.

The results of the monitoring are summarized in Table 3. The thickener's treatment performance is evaluated in Table 10. Over the three-day monitoring period, approximately 46% of the TSS and 93% of the settleable solids were removed. Total cyanide was reduced by 12% and phenol by 3%. There was a net increase in ammonia and total iron on all three days. O/G remained at low levels and was not removed.

Data submitted by USSC for February 1971 to April 1973 show that approximately 88% of the TSS was removed by the thickener [Table 11]. Additional parameters were not monitored.

NO. 1 BLAST FURNACE COOLING WATER

The No. 1 blast furnace cooling water is discharged to the White Street storm sewer which flows to outfall 009. This discharge was monitored at the manhole in the conditioning yard, next to the No. 4 blast furnace thickener [Table 5]. The flows were not determined. The discharge was equivalent to the intake waters.

RIVER INTAKE

The intake pumphouse is located immediately upstream of outfall 008 [Fig. 2]. The intake structure consists of rough bar screens and two traveling screens. The traveling screen backwash water is discharged directly to the river without treatment via an unpermitted outfall. Intake pumps are located at the pumphouse and the blow house. There are three electric pumps at the pumphouse, each rated at 25 mgd. Only one electric pump is used under normal operating conditions. During the survey, pump No. 1 was operational, No. 2 was dismantled for repair and No. 3 was ready for standby use. The three pumps at the blow house are steam-driven; these pumps have rated capacities of 15, 20 and 40 mgd. Only the 40 mgd pump is used, the other two serve as standby units.

Table 10

BLAST FURNACE NO. 1 THICKENER TREATMENT PERFORMANCE
USSC NATIONAL STEEL PLANT
FEBRUARY 3-6, 1976

	Date (Feb.)				Average
	3	4	5	6	
TSS (mg/l)					
Influent		2,400	720	820	
Effluent		750	480	520	
% removal		69	33	37	46
Settleable Solids (ml/l)					
Influent	2	2.5	7.5		
Effluent	0.1	0.4	0.1		
% removal	95	84	99		93
Oil/Grease (mg/l) [†]					
Influent		2	2		
Effluent		2	1		
% removal		0	50		
Phenol (mg/l) [†]					
Influent		0.44	0.60	0.70	
Effluent		0.43	0.57	0.68	
% removal		2	5	3	3
Total Cn (mg/l)					
Influent		1,300	1,100	1,100	
Effluent		1,200	1,000	900	
% removal		8	10	18	12
Ammonia (mg/l)					
Influent		77	82	78	
Effluent		91	87	86	
% removal		Increase	Increase	Increase	Increase
Total Iron (mg/l)					
Influent			85	78	
Effluent			89	88	
% removal			Increase	Increase	Increase

[†] Average of daily grab samples.

Table 11
NO. 1 BLAST FURNACE THICKENER
TSS REMOVAL EFFICIENCIES[†]
USSC NATIONAL WORKS
February 1971 to April 1973

Date	Influent (ppm)	Effluent (ppm)	Performance (%)
2-22-71	4,315.6	218.8	94.93
3-01-71	7,205.6	440.2	93.89
4-01-71	13,229.4	557.0	95.79
5-03-71	11,296.0	500.6	95.57
6-01-71	6,709.0	244.4	96.36
7-01-71	13,391.6	76.6	99.43
3-24-72	268.6	250.2	6.86
4-03-72	108.2	73.6	31.98
5-03-72	8,432.6	106.0	98.74
6-23-72	17,795.6	327.6	98.16
7-05-72	6,006.4	266.0	95.57
8-03-72	9,122.0	628.0	93.12
9-04-72	7,902.2	1,032.4	86.94
10-02-72	3,809.6	236.4	93.79
11-06-72	10,734.8	883.2	91.77
12-04-72	4,552.8	270.8	94.05
1-04-73	6,037.0	276.0	95.43
2-05-73	7,597.6	260.0	96.58
3-05-73	9,333.6	50.0	99.46
4-02-73	1,258.0	48.4	96.15

Average 87.73

[†] Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.

The theoretical intake volume under normal operating conditions would be 246,000 m³/day (65 mgd).

The intake water in the pumphouse is measured by venturi tubes and manometers and the instantaneous flow is indicated on a control board in the basement of the pumphouse. The flows are not recorded. During the survey, the No. 1 pump flow gage was the only working unit. USSC personnel stated that the venturi tubes and manometers for the other two pumps were not working and needed to be cleaned. Intake flows at the blow house are measured by orifice plates and continuously recorded on circular charts.

The intake volumes pumped for February 3-6, 1976 were as follows:

Date (Feb.)	Pumphouse		Blow House [†]		Total	
	m ³	gal x 10 ⁶	m ³	gal x 10 ⁶	m ³	gal x 10 ⁶
3-4	86,300	22.8	131,700	34.8	218,000	57.6
4-5	86,300	22.8	131,300	34.7	217,600	57.5
5-6	85,900	22.7	131,700	34.8	217,600	57.5

[†] Integrator flow for 24-hr period

The volumes of intake water pumped from the Monongahela River, and treated water purchased from the City of McKeesport for July 1974-June 1975 are summarized in Table 12.¹ River intake volumes ranged from 1.2×10^5 to 1.9×10^5 m³/day (32 to 50 mgd) and averaged 1.5×10^5 m³/day (40 mgd); approximately 2.2×10^3 m³/day (0.59 mgd) of City water is purchased for process use. The USSC-estimated volume of wastewater [Table 1] discharged from outfalls 001-010 is 2.25×10^5 m³/day (59.6 mgd). The intake water pumped from the river during the survey was about 96% of the USSC-estimated wastewater discharged.

Table 12
RIVER INTAKE WATER AND CITY WATER VOLUMES[†]
USSC NATIONAL PLANT
JULY 1974-JUNE 1975

Month	River Intake		City Water				River Intake+City Process	
	$\frac{m^3}{m^3} \times 10^6$	gal $\times 10^9$	Sanitary $\frac{m^3}{m^3} \times 10^6$	gal $\times 10^6$	Process $\frac{m^3}{m^3} \times 10^6$	Total gal $\times 10^6$	$\frac{m^3}{m^3} \times 10^6$	gal $\times 10^3$
July 1974	3.8	1.0	118	31.2	85.9	22.7	204	53.9
August	3.8	1.0	106	28.0	76.1	20.1	182	48.1
September	4.2	1.1	100	26.5	73.1	19.3	173	45.8
October	4.2	1.1	117	30.8	82.9	21.9	199	52.7
November	4.2	1.1	100	26.5	67.4	17.8	168	44.3
December	4.2	1.1	121	32.0	78.7	20.8	200	52.8
January 1975	4.2	1.1	126	33.3	66.6	17.6	193	50.9
February	5.3	1.4	125	33.0	57.2	15.1	182	48.1
March	5.3	1.4	144	38.1	49.2	13.0	193	51.1
April	5.7	1.5	140	36.9	60.9	16.1	201	53.0
May	5.7	1.5	133	35.1	53.4	14.1	186	49.2
June	4.9	1.3	123	32.5	53.4	14.1	176	46.6
Monthly Average	4.5	1.2	121	32.0	67.0	17.7	188	49.7
								1.24

[†] Letter dated January 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Mr. Stephen Vassere, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.

The river intake water was sampled from the discharge side of the No. 1 pump in the pumphouse. The screen backwash water was also sampled for TSS and settleable solids. The solids concentrations in the backwash water were equivalent to the intake concentration [Table 3].

V. MONITORING REQUIREMENTS

Monitoring requirements include both sampling and flow measurement. Because the daily wastewater flow varies, composite samples should be collected on a flow-weighted basis over the 24-hour monitoring period rather than a set of grab samples over a short period.

Because the outfalls were submerged, flows could not be measured by the tracer technique and the alternate monitoring locations were not amenable to flow measurement using portable flow measuring equipment. Permanent flow measurement devices should be installed on all process wastewater outfalls. This will require modifications to the outfalls for protection from flooding conditions.

USSC currently uses the tracer technique to measure the flows from all outfalls except 002.¹ A lithium chloride solution is injected into the wastewater stream at an upsewer location over a 5-minute period. Samples are collected at 1-minute intervals for a minimum of 5 minutes and analyzed for lithium. The instantaneous flow is calculated and is used as the total daily flow, i.e., the flow is assumed to be constant. Flows reported in the Discharge Monitoring Reports vary; therefore, the wastewater flows undoubtedly vary over the 24-hour monitoring period. If USSC personnel continue to measure flows with the tracer technique, the flows should be recorded on a continuous basis at all process outfalls, and at least six instantaneous flow measurements should be made over the 24-hour period on the cooling water outfalls. The tracer technique cannot be used whenever the outfalls are submerged; therefore, protective structures are needed for sampling and flow measurement purposes. Conventional flow measuring devices may be installed when the protective structures are constructed to eliminate the problems involved with the tracer method.

Recommended monitoring requirements are listed in Table 13. The rationale for each outfall is discussed below.

OUTFALL 001

If the wastewater in this discharge only contained cooling water from the air compressor, then monitoring of flow, pH and temperature would be adequate on a quarterly basis. However, all samples collected for TSS, O/G and total iron had high concentrations of these constituents, typical of process wastewaters. Therefore the discharge should be monitored weekly⁴ to characterize the flow and pollutants discharged, unless USSC is able to isolate and eliminate the source of the pollutants. If this is done, monitoring should be conducted quarterly as recommended by the Office of Permit Programs.

OUTFALLS 002, 003 and 010

The effluents from the three settling basins contain process wastewaters. The flows ranged from 6,050 to 52,200 m³/day (1.6 to 13.8 mgd). The three outfalls should be monitored for TSS and O/G a minimum of once per week.⁴ Total cyanide should also be monitored weekly at outfall 010 since the No. 1 blast furnace discharges to basin C.

OUTFALLS 004, 005, 006, 008 and 009

These outfalls contain cooling water according to USSC; therefore, monitoring should only be conducted once per month for flow, pH and temperature. If blast furnaces No. 2 and 4 become operational, then the flows from outfalls 008 and 009 should be measured continuously and the effluent should be monitored at least once per week for the same constituents as outfall 010.

Table 13
RECOMMENDED MONITORING REQUIREMENTS
USSC NATIONAL PLANT

Outfall	Effluent Parameter	Measurement Frequency	Sample Type
001	Flow	1/week	Minimum of 6 instantaneous measurements over 24 hours
	pH	1/week	Grab
	Temperature	1/week	Grab
	TSS	1/week	Flow-weighted composite
	O/G	1/week	3 grab samples/24 hours
	Total Iron	1/week	Flow-weighted composite
002	Flow	Daily	Measured continuously
	pH	1/week	Grab
	Temperature	1/week	Grab
	TSS	1/week	Flow-weighted composite
	O/G	1/week	3 grab samples/24 hours
003	Flow	Daily	Measured continuously
	pH	1/week	Grab
	Temperature	1/week	Grab
	TSS	1/week	Flow-weighted composite
	O/G	1/week	3 grab samples/24 hours
004, 005 006, 008 009	Flow	1/month	Minimum of 6 instantaneous measurements over 24 hours
	pH	1/month	Grab
	Temperature	1/month	Grab
007	Flow	1/week	Minimum of 6 instantaneous measurements over 24 hours
	pH	1/week	Grab
	Temperature	1/week	Grab
	TSS	1/week	Flow-weighted composite
010	Flow	Daily	Measured continuously
	pH	1/week	Grab
	Temperature	1/week	Grab
	TSS	1/week	Flow-weighted composite
	O/G	1/week	3 grab samples/24 hours
	Total Cyanide	1/week	Flow-weighted composite

OUTFALL 007

Monitoring for flow, pH, temperature and TSS should be conducted at least once per week since USSC reports an average flow of 3,800 m³/day (1 mgd).⁴

INTAKE

The intake water should be monitored at the same time that the outfalls are monitored. Samples should be collected after screening instead of at the river. The intake pipes are below the surface of the river where quality may be different from that at the surface. O/G will be higher at the surface due to flotation. Collection of intake samples after screening will insure that the samples are representative of the water distributed in the plant.

REFERENCES

1. Letter - Jan. 28, 1976 with attachments from J. L. Hamilton III, Manager, Environmental Control - Water, USSC, to Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, Philadelphia, Pa.
2. Letter - Nov. 17, 1975 from Stephen R. Wassersug, Director, Enforcement Division, USEPA, Region III, to Earl W. Mallick, Vice President, Environmental Control, USSC, Pittsburgh, Pa.
3. Letter - Apr. 19, 1976 with attachment from James L. Hamilton III, Manager, Environmental Control - Water, USSC, to F. L. Voight, USEPA, Region III, Philadelphia, Pa.
4. "Permit Program Guidance for Self-Monitoring and Reporting Requirements," Office of Permit Programs, USEPA, Washington, D.C., Apr. 30, 1973.

APPENDICES

- A Reconnaissance Report
- B Field Study Methods
- C Chain of Custody Procedures
- D Analytical Procedures, Quality Control

APPENDIX A

Reconnaissance Report - USSC National Plant

REPORT ON EPA RECONNAISSANCE/INSPECTION OF SEPTEMBER 23-27, 1975 AND PRELIMINARY EVALUATION FOR PROSPECTIVE NEIC FIELD SAMPLING SURVEY, U. S. STEEL CORPORATION, NATIONAL STEEL PLANT, MCKEESPORT, PA.

The National Steel Plant is combined with the Duquesne Steel Plant on the other side of the Monongahela River to give a single USSC management unit known as the National-Duquesne Works. National is the upstream plant located on the south side of the Monongahela River at McKeesport, Pa. and about 14.5 miles above the Ohio River at Pittsburgh. Duquesne is the downstream plant located on the west (or north) side of the River at Duquesne, Pa. and about 12.5 miles above the start of the Ohio River. National Steel is primarily a steel finishing facility producing hot and cold formed products including electric resistance weld pipe, submerged arc weld pipe, seamless pipe, and bars and rounds. However, National also has primary hot rolling in two bloom-billet mills and a series of blast furnaces. Only one blast furnace is currently operational directed entirely to ferromanganese production. Capacity production figures for National appear to approximate 2550 TPD hot formed seamless pipe; 5600 TPD hot formed billets, blooms, bars and rounds; and 500 TPD ferromanganese. Production figures are not certain for cold formed steel products.

The Duquesne Plant basically produces iron and steel but also has considerable hot forming of billets, bars and rounds and some slabs. Capacity production at Duquesne approximates 7550 TPD basic iron via blast furnaces, 8100 TPD BOP steel, 800 TPD electric furnace steel and 6100 TPD hot forming of primary and finished steel.

As best determined, water intake or the total of wastewater and cooling water discharges for National are in the range of 28 to 60 MGD. National is identified by a multitude of scale pits at various points throughout the Plant and by three large settling basins which have been constructed along the side of the Monongahela River for terminal treatment. Waste outfalls at National are also located in such manner so as to be seriously impacted by high River stage.

National has ten known outfalls i.e., 001 to 010 plus a number of storm sewers traversing USSC property. Four of these outfalls, 002, 003, 009 and 010 are thought to contain the majority of waste loads from USSC, National Steel. A minimum field survey effort is tentatively suggested for National placing top priority on but 12 sampling locations. Assuming reasonably dry weather, only two of these locations might be impacted by the River whereby sampling location may need to be moved from the River to an alternative upstream manhole on the sewer line.

Persons In Attendance, during EPA Reconnaissance of September 23 - 27, 1975 at USSC, NATIONAL STEEL MILL included:

Roy Weiskircher, Chief Environmental Officer, USSC, National-Duquesne Works (located at Duquesne Plant), Duquesne, Pa. 466-8000 X2219
Robert D. Dunham, USSC, Corporate, Environmental Office, 600 Grant Street, Pittsburgh, Pa.
Tom H. Johns, USSC, Plant Engineer, USSC, National-Duquesne Works (located at Duquesne Plant), Duquesne, Pa.
George Sorona, USSC, In Charge, Spectrograph Lab at BOP Shop, Duquesne Plant, National-Duquesne Works, Duquesne, Pa.
Walter T. Sarsfield, Engineer, Pennsylvania Dept. Environmental Resources, (PENDER), Pittsburgh, Pa. 565-5091
Barrett Benson, NEIC, Denver, Colorado
Robert Harp, NEIC, Denver, Colorado
Ed Struzeski, NEIC, Denver, Colorado
Matt Miller, EPA, Region III, Philadelphia, Pa.

BACKGROUND

The National Steel Plant of USSC, i.e. the National Tube Division Plant located at McKeesport, Pa. on the south side of the Monongahela River at the intersection of the Youghiogheny and Mon Rivers, primarily produces finished tubular products and electric weld pipe from steel plates and coils. Sections of this plant were originally constructed in the late 1800's with improvement and expansion programs through the 1960's. National in the 1960's consisted of 4 operating blast furnaces (Nos. 1,2,3,4) together with stoves, gas scrubbers and a sintering plant. At that time there were 3 Bessemer Converters and an open hearth shop of 3 furnaces, all of which have been discontinued. The National Plant is also equipped with rolling mills, conditioning facilities, two seamless tube mills, finishing mill, an electric weld pipe mill, electric resistance weld pipe mill, and various other shops. In the mid-60's the plant was reported as operating 24 hours/day with 4,000 - 5,000 plus employees of which 10% of the employees were on the first turn (shift), approximately 70% on the second turn, and about 20% on the third turn. The newest section of the Plant on the most recently acquired land, appears to be that containing the electric resistance weld mill extending west or upstream at and above Outfall 001.

The National Plant currently consists of the following major operations:

- Nos. 1 and 2 Seamless Tube Mills (constructed in the 1930's)
- Nos. 1 and 2 Bloom Mills
- 32-inch bar mill and hot bar saws inside same mill.
- Electric Resistance Weld (ERW) Mill
- Submerged Arc Weld Mill (Electric Weld Mill)
- Pickling-Galvanizing of Couplings (inside electric weld mill bldg.)
- Three Blast Furnaces (Nos. 1,2 and 4). Only BF No. 1 was operational September 1975. No. 1 has been specially equipped with additional coolers to allow higher operating temperatures, and consequently has been converted entirely over to FeMn production.

This has made National the primary producer of "Ferro" for U.S. Steel Corp.

Fact Sheet and Permit Rational - The Fact Sheet accompanying the EPA Dec. 1974 Draft NPDES Draft Permit gives production for the combined National-Duquesne Works as 16,850 TPD of hot formed metal, 7,550 TPD of iron, and 8,900 TPD of steel. Two pumping facilities supply the overall facility with 153 MGD of water from the Monongahela River with all discharges going back to the same stream.

The Rationale accompanying the Draft NPDES Permit of Dec. 1974 further amplifies production as given below:

- Outfall 002 (Electric Weld Pipe Mill, Basin "A")-2,600 TPD hot formed finishing
- Outfall 003 (Seamless Pipe Mill, Basin "B")-2,550 TPD hot formed finishing
- Outfall 010 (Bloom and Bar Mill, Basin "C")-5,600 TPD hot formed finishing, plus unspecified production of sinter plant.

Outfall Description - The Draft Permit and Fact Sheet of December 1974 describes the 10 Outfalls and NPDES Monitoring points for the National Steel Plant as follows:

- 001 - Effluent from boiler shop, 0.12 MGD, untreated; reported as containing Locust St. storm sewer. Monitoring to be carried out on waste line prior to Locust St. sewer
- 002 - Effluent from electric weld pipe mill, treated via large Settling Basin "A". Flow reported as 3.45 MGD. Discharge to be monitored at effluent from Settling Basin "A" to Monongahela River.
- 003 - Effluent from seamless pipe mill(s), 4.89 MGD, treated via scale pits and large Settling Basin "B". Flow to be monitored at effluent from Settling Basin B to Mon River. Outfall 003 also contains the Huey St. storm sewer.
- 004 - Effluent from No. 1 Pump Station, 0.47 MGD, untreated, to be sampled at terminus of sewer with Mon River.
- 005 - Effluent from Power House, 0.50 MGD, untreated, to be sampled on Outfall near discharge to River.
- 006 - Cooling water effluent from Central Boiler House, untreated, 0.75 MGD; to be monitored at manhole just prior to 006 sewer line.

007 - Process water spent effluent from Central Boiler House, untreated, reported as 0.45 MGD, to be sampled on Outfall near its point of release to the River.

008 - Effluent from Blow House and No. 1 Blast Furnace, 7.98 MGD, untreated. Monitoring point was specified at end of Outfall 008 into Monongahela River.

009 - Effluent from No. 1 Blast Furnace with estimated flow of 2.28 MGD. If Blast Furnaces 2 and 4 become operational, the discharge is expected to increase to full flow of 12.51 MGD. Outfall 009 also contains the White Street storm sewer. Permit specifies that flow shall be sampled at end of Outfall 009.

010 - Effluent from sinter plant, gas washer system, bloom and bar finishing mills, treated principally via large Settling Basin "C". Flow reported as 7.50 MGD. Discharge to be monitored at point of release from Basin C into the Mon River.

The ten waste flows cited above amount to 28.39 MGD. With Blast Furnaces 2 and 4 in operation, total flows could increase to 38.62 MGD. The National Steel Mill has a single water intake from the Monongahela River located between Outfalls 007 and 008. Total water withdrawals from the Mon River for the National Plant are in the range of 28-40 MGD. At least five storm sewer networks (in addition to the 3 above) are reported inside the USSC-National Plant grounds. These include the Walnut and Market St. storm sewers upstream of Outfall 001; the Martin Street sewer situated between Outfalls 005 and 006; the Center Street sewer between 007 and 008; and the Crooked Run drainage course thought to contain both storm and sanitary sewage and located below the furthest downstream Outfall of 010 and above the McKeesport car bridge.

The National Steel Mill is on the south side of the Mon River spread over about 1.5 miles of river front between the Youghiogheny River and the McKeesport Bridge. National is located entirely inside the city of McKeesport. River mileages of the various Outfalls are given below:

Outfall 001	-	R.M. 15.25
Outfall 002	-	R.M. 15.17
Outfall 003	-	R.M. 15.00
Outfall 004	-	R.M. 14.93
Outfall 005	-	R.M. 14.84
Outfall 006	-	R.M. 14.77
Outfall 007	-	R.M. 14.71
Outfall 008	-	R.M. 14.58
Outfall 009	-	R.M. 14.51
Outfall 010	-	R.M. 14.44

Downstream municipal water supplies receiving water from the Monongahela River include the North Versailles Township Waterworks about 2.5 miles below the USSC National Plant, and the Borough of Braddock Waterworks another mile further downstream. North Versailles provides filtration and chlorination as treatment for its water intake and Braddock is reported as using softening, filtration and chlorination. The city of Duquesne about 2 miles below National has a series of artesian wells directly adjacent to or within the Monongahela River bottoms. No direct connection is thought to exist between these artesian wells and the Mon River. The West Penn Water Co. withdraws its water supply at River Mile 4.6.

PRODUCTION

As mentioned above, the Fact Sheet for the complete National-Duquesne Works gives production as:

16,850 TPD hot forming operations
7,550 TPD iron, and
8,900 TPD steel

The Duquesne Plant was said to break down to:

7,550 TPD iron from the basic iron blast furnaces
8,100 TPD (BOP steel) + 800 TPD (Elec. furnace steel)
= 8,900 TPD total steel
6,100 TPD hot forming

The National Plant may therefore be calculated as having a production of 10,750 TPD hot formed, finished steel. This checks with previous figures for National. These figures also show National to be almost entirely a steel finishing mill.

Additional production data obtained from Tom Johns and Roy Weiskircher September 23 - 27 together with other inputs indicate the following:

DUQUESNE -

BOP: 2 kettles, one going and the other as standby; each kettle 215 tons per heat. Normally 3 turns/day but currently running only two, 7 days/week. Capacity is 36 heats/day with 24 heats going to the Duquesne primary mills and 11 going to National primary mills. Capacity = 36×215 tons = 7740 TPD, or 35×215 tons = 7525 TPD BOP steel. These figures are noted as being slightly lower than previous capacity figures. Current 2 turn operations means prevailing production is about 65% of capacity.

Electric Furnace Steel: 5 furnaces available at Duquesne, 4 rated at 85 tons each and 1 at 20 tons. Electric furnace steel is produced in roughly 6 hours. Johns estimated electric furnace production capacity as 700 TPD. Of this, he predicted 200 TPD would remain at Duquesne and 500 TPD could go to Homestead. Electric furnace steel is generally stainless or other special-alloy steel. The permit specifies electric furnace steel production as 800 TPD with 384 TPD reported as passing through vacuum degassing at Duquesne. Johns and Weiskircher could not provide us with an equivalent figure for vacuum degassing.

Blast Furnaces: The draft NPDES permit specifies iron production at the combined works as 7,550 TPD but does not give respective production for each facility. Materials provided to the State in 1963 describe the four Duquesne Blast Furnaces as having the following capacities:

No. 1 - 60 TPH	=	1,440 TPD iron
No. 3 - 68 TPH	=	1,632 TPD
No. 4 - 78 TPH	=	1,872 TPD
No. 6(Dorothy)-116 TPH	=	<u>2,784 TPD</u>

Total = 7,728 TPD

Currently only Blast Furnaces Nos. 4 and 6 at Duquesne are operational (4656 TPD = 60%) with little chance for Nos. 1 & 3 coming on line any time in the near future. No basic iron is being produced at National.

Primary Hot Rolling Mills, i.e. 46-inch, 36-inch & 21-inch:

Slabs off the 46-inch mill which are not further processed in the 36 and/or 21-inch mills may be cooled and forwarded either to the USSC Irvin or Gary, Ind. mills for subsequent manufacture of sheet tin strip. Semi-finished steel out of the 36 and/or the 21-inch mills can be forwarded to the No. 5 Bar Mill at Duquesne depending upon sizes needed or may be converted to rounds. These rounds will vary from 3 1/2 to 10 inches in diameter. The Duquesne Nos. 6 and 7 bar mills were discontinued in the late 60's. Equipment has been removed even although the buildings still remain. Support materials to the draft permit indicate a capacity production of 5,000 TPD associated with the three primary, hot-rolling mills and 1,100 TPD capacity production for the No. 5 Bar Mill. The 46-inch mill also has a large automatic scarfing machine. Approximately 34% of the 46-inch mill product passes through this scarfer.

NATIONAL

The National Mill is primarily a steel finishing facility with ingots being shipped across a RR crossover bridge from the Duquesne mill into a series of 26 soak pits on the National side. National is currently running 2 turns per day for most operations and 5 days per week. Some operations may consist of one 1 turn daily whereas others may be for 6 or 7 days rather than 5, e.g. the Blast Furnace. Current employment at the National and Duquesne Plant are each at around 3,000 persons with a peaking employment of around 3,600 persons.

Seamless Tube (Pipe) Mills: Two such hot rolling mills are available, i.e. Nos. 1 and 2. No. 1 operates most of the time whereas No. 2 is utilized primarily as standby. The draft NPDES permit specifies capacity production in this sector as 2,550 TPD, which may be slightly high. Capacity is reported by Tom Johns for the seamless area as 2 turns daily. Johns' calculations showed on the No. 1 Seamless line approximately 2 heats/turn = 400 tons and for No. 2 - 3 heats/turn = 600 tons. Two turns yield about 2,000 TPD. It was nevertheless indicated that production could be easily raised to 2,500 TPD with about 500 TPD then going to Lorraine, Ohio or one of the other USSC mills. Maximum number of turns per week is about 18, which according to Johns gives an equivalent 15 turns of actual production.

Electric Weld Pipe Mill: This is mostly if not all, submerged arc weld pipe made by cold rolling operations from Homestead plate. The permit specifies capacity production of 2,600 TPD, which seems very high.

Electric Resistance Weld Mill: This product is made from coiled strip steel received from Irvin, Gary, and even Fairless. This cold-rolled steel is bathed in water-soluble oil which in turn is completely recycled for reuse. The ERWM is essentially considered to be a no-discharge mill.

Primary Bloom/Billet Mills and Bar Mill: Ingots are received either into the No. 1 or the No. 2 Bloom Mills at National then sent to the Bar Mill for production of bars or rounds. The rounds are hot sawed to yield billets or short section rounds. The rounds are cooled and peeled and may be hand-scarfed. The sections are

then transferred to the Seamless Pipe Mills. "Structural Hollows" were previously produced in addition to seamless pipe but market conditions have apparently caused discontinuance of this product. The draft NPDES permit specifies hot forming - steel production capacity of 5600 TPD, but this could only occur if all 11 heats of steel from Duquesne passed through the Bloom Mills, all of which in turn were to pass through the Bar Mill.

Blast Furnace: Only the No. 1 Blast Furnace continues to operate at National devoted exclusively to FeMn production. Capacity production of the No. 1 Blast Furnace is rated around 500 TPD FeMn (or 1,000 - 1,100 TPD equivalent basic iron-to be verified). It is importantly noted that the FeMn Blast Furnace is said to operate as a closed circuit at least from a water pollution control standpoint. FeMn is cast into sand beds at the National site.

OUTFALLS AND SPECIFIC PROCESSING

A highly-simplified schematic of National - Duquesne processing is shown in an attached figure to this report.

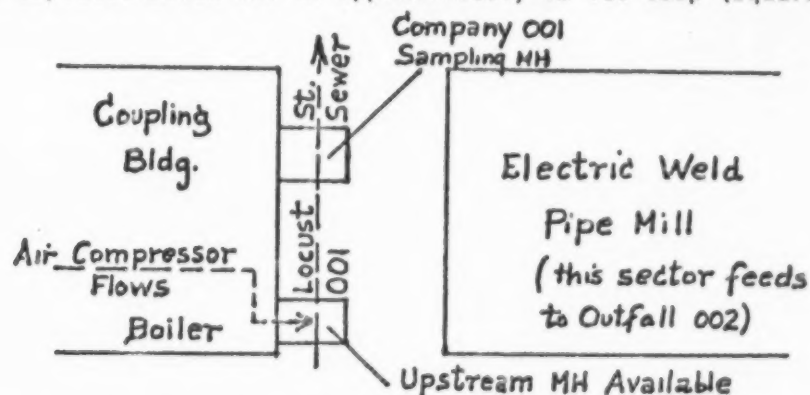
The National Plant waste outfalls described in previous materials, are further depicted in accompanying figures and sketches with this report. Individual outfalls are discussed together with specific Industrial operations served by each sewer line.

Upstream Storm Sewers - Market Street and Walnut Street Sewers

Weiskircher reported the existence of two large storm conduits upstream of the National 001 outfall. Both sewers cross USSC property in the area of the ERWM which is reported to have essentially zero discharge. These storm sewers also cross under the product storage yards and RR tracks. We saw an abundance of yellow band steel in the National Steel storage yards. A spent water soluble spent oil storage overhead tank of 100,000 gallon capacity is noted directly adjacent and south of the alleged Walnut Street storm sewer terminus with the Monongahela River. This storage tank serves the cold rolling ERWM. The spent oils are hauled out by contractor service. Weiskircher indicated that roof drains etc. from the ERWM and adjoining sectors are tied into these storm sewers. We attempted to locate the storm sewers but whether due to very high river flow the week of September 23 or that these sewers are deeply submerged, we could not visually locate either line.

001 Outfall and Locust Street Storm Sewer.

Locust Street is the location of 001 sewer and is also the site of the Main Gate into the National Plant. Outfall 001 is sampled on the storm sewer on the west side of Locust Street between the Coupling Department and the Electric Weld (Submerged Arc Weld) Building. Flow serving this outfall is believed to be derived entirely from city water rather than Mon River water, hence Gross rather than Net limits should be used. Total city water use is believed to be 1MGD or less throughout all of the National Plant. The single source of wastewater to 001 is reported by the Company to be an air compressor or contributing intercooler and aftercooler flows to the sewer. USSC considers this discharge to be NCCW. Flow is judged quite small. The Company sampling point is depicted below for an approximately 12 ft. deep (square box) manhole.



We did not raise the cover of the manhole. Distance from this sampling point to the River was considerable, i.e. around 750 feet.

For Outfall 001 the draft NPDES Permit allows USSC to provide estimated flows rather than directly measured flows. Due to high River stage, we were not able to spot the 001 discharge at the River. The River bank is very steep and undergrowth appreciable. This outfall although submerged both during NERC, Las Vegas' aerial reconnaissance mission of September 24, 1974 and EPA's Boat Run of June 21, 1975, was indirectly "visible" during each of the two latter inspections. On June 21, pictures taken of the 001 outfall showed a heavy soapy white layer on the surface of the water just below the River bank. Lithium chloride flow measurement has been tried by USSC adding the chemical to the air compressor outflow box and capturing the effluent at the 001 sample MH. The addition point was however only 70-100 ft. ahead of the measurement point. Both the draft NPDES permit and Steel's self-monitoring provide a flow for 001 of 0.12 MGD.

Outfall 002 Containing Electric Weld, Seamless Pipe and Electroplating.

Sewer 002 serves a sizeable sector of the west side of the National Steel Works including the Arc Weld Mill, electroplating and painting of couplings at the NW sector of the Electric Weld Building, Seamless Mills Nos. 1 and 2, and also a quench and temper line. It was previously reported to Region III that

the Seamless Mills entirely drained to Outfall 003. However we are now told a central sewer drains the Seamless Pipe Building from east to west, and the Seamless waste flows can go to either or both of 002 or 003. The 2600 TPD in the permit rationale for 002 would seem to have reference to arc weld pipe production but the permit was written for hot forming rather than cold forming and welding. Outfall 002 is now reported to have both cold rolling from the submerged arc weld mill and an undefined hot forming production from the Seamless Pipe Mills Nos. 1 and 2 side. Plant personnel more clearly explained that the No. 1 seamless flows generally end up in 002 but nevertheless can find their way to 003. The No. 2 seamless mill almost always flows to 003 but once in a while is captured by 002. Seamless pipe product out of these various mills is beveled, finished, etc. One also finds quench and temper facilities inside the seamless mills which contribute further waste flow. These operations all serve to comprise a relatively large pipe mill building. The submerged arc pipe runs up to about 36 inches in diameter. It is cold-formed from Homestead plate steel and most of the pipe is specially-lined.

The Electric Weld Mill conducts galvanizing of couplings and various pipe conditioning operations. The couplings are the sleeves at the end of the pipe sections serving to protect the end threading particularly during transport. After shipment and field use, the buyer will normally return the couplings back to USSC. The plating sequence is roughly explained as follows. The couplings carried in large wire baskets are immersed in a caustic soda bath which serves to basically remove oils off the coupling sections. This oil winds up in the terminal settling Basin "A" at the end of the 002 outfall. The caustic bath is changed every 4 weeks and utilizes 4300 lbs. caustic on each new batch. The spent caustic bath is dumped to the sewer and finds its way to Basin "A". After the concentrated caustic solution, the parts are rinsed in continuously flowing hot water (second tank) and then enter a concentrated sulfuric acid solution bath where parts are immersed for cleaning from one-two minutes. A fresh concentrated acid solution is rated around 60%. With repeated pickling, the sulfuric acid strength falls to about 46% near which time the concentrated spent acid is replaced. This concentrated waste acid is transferred to one of three available overhead tanks just north and outside the electric weld building. This spent acid is scavenged by Mill Service Inc. a special licensed contractor, who hauls the waste acid to a dumping site at Yukon, Pa. Approximately 50,000 gallons of concentrated spent acid is said to be scavenged annually. A fourth tank is available outside the building in this case for storage of "new" acid. Adjacent to the four tanks is a small concrete basin approximately 10 ft. x 20 ft. which serves to provide limited detention to the caustic and acid rinses associated with electroplating prior to their release to Settling Basin "A". Oils were minimal in this small chamber. There were no provisions for the collection and removal of oils, solids or other, from this chamber.

The coupling parts after pickling are inserted into a "Patent" tank. The parts receive a cold water rinse, the couplings are arrayed in vertical position and a lid is placed on the tank for zinc plating, utilizing a zinc

anode. Plating is conducted for 12-15 minutes and this is followed by a cold water rinse, then a hot water rinse. The lid is taken off the Patent Tank, the tank overturned and the parts and liquid contents dumped. The parts are subsequently stacked, painted, stored and/or shipped. All of the above rinses are continuous. Painting of the various pieces is carried out in the same plant area, the parts being painted by brush as they come down a discharge chute. Electroplating and galvanizing at National have not previously been reported to Region III.*

Steel members are received into the Seamless Pipe Mills from the National Bloom and bar mills via a series of steps including conditioning, peeling, scarfing, then over to the billet storage area. The pieces are transferred by rail to the seamless pipe sector, off-loaded by crane onto tables and into the reheat furnaces preparatory to piercing and seamless tube operations. Finishing operations include bevelling, threading, quenching and tempering, etc. The Bloom/Bar Mills employ hand scarfing of billets and/or rounds which consists of manual torch spot treatment. It is noted that "Structural Hollows" are no longer made in this or any part of the National operations. Rudimentary waste treatment inside the Electric Weld and Seamless Tube Pipe Buildings consists of many small-sized scale pits below floor level spread throughout plant processes. Most of the pits are overlaid with removable but solid plate whereas others have open grating. As shown in an enclosed sketch to this report, waste flows pass through some 30 scale pits enroute to Settling Basin "A". The efficiency of these pits (arranged both in series and parallel) in removing solids, oils and other contaminants, is not well known.

Additional information on scale pits primarily in the Nos. 1 and 2 Seamless Mills is given by State of Pennsylvania Industrial Waste Applications 463144 and 463136 for treatment facilities at USSC, National. This data was prepared in the 1960's.

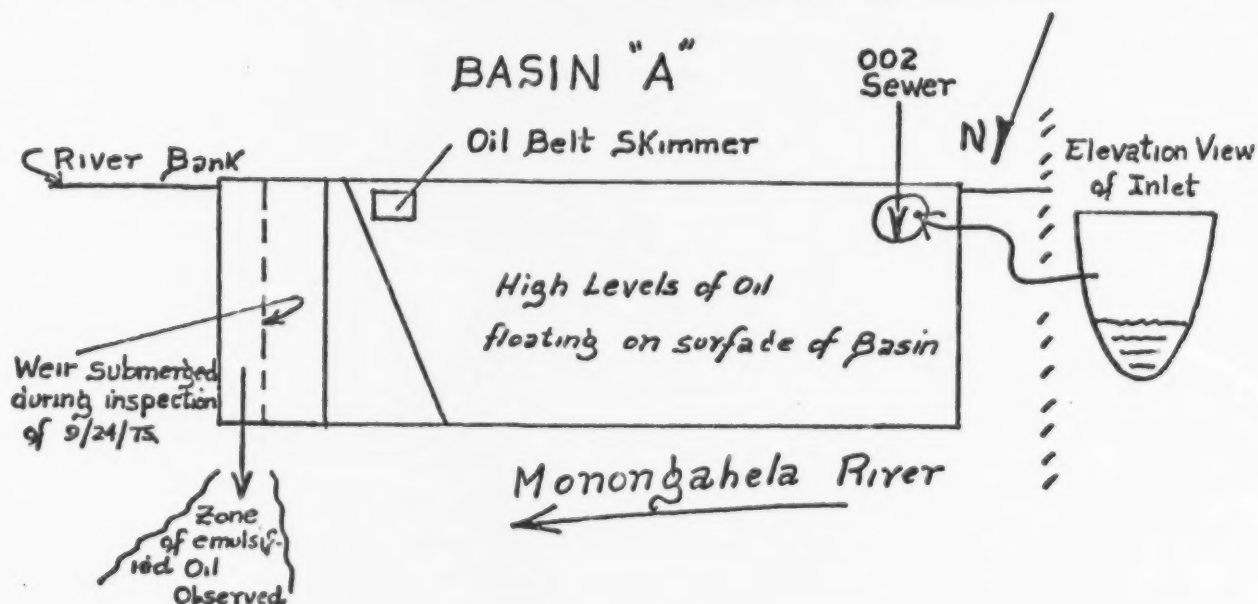
For the No. 1 Seamless Mill, operations were reported to be serviced by a total of 13 scale "settling" pits". These pits are located throughout the mill in groups of one, two, three or four pits in series to provide treatment facilities for the following operations: First Piercer, Second Piercer, High Mill Reelers, Sizing Mill, and the four cooling tables. Each of the pits contains a removable scale bucket which is "immediately" emptied when full.

*Earlier materials in the State files indicate further discharge of caustic and acid rinse waters from "Pipe Conditioning". The current disposition of these practices, if still existent, and their precise location in the plant, are not known. Previous description relates that pipes, cylinder and specialty items requiring conditioning are cleaned by immersing in a caustic soda solution and then rinsed in water. Next, the items are immersed in an acid pickling bath and again rinsed in water to complete the process.

The effluents from all these pits discharge to a common sewer which leads to the Monongahela River. Design data showed that nine pits were 5'-9" x 4'-9" x 5' - 6" deep when empty, and the other four pits 4'-3" x 3'-3" x 5'-0" deep when empty. Flow was established as 3.45 MGD from the No. 1 Seamless Mill. Certain data in the 1960's showed that 30.5 TPD scale or gross solids were being removed by various pits in the No. 1 seamless sector. The effluent contained 1.8 TPD which roughly suggests according to the company, a solids removal of 94.4% was achieved. Company design data for Basin A following these pits projected 125 ppm or 1.80 TPD of TSS entering Basin A and a final Basin effluent of 69 ppm or 0.805 TPD of TSS. Overall solids removal efficiency calculated by USSC on this circuit was 96.9%. The effluent was predicted as containing less than 30 mg/l oils and 0.993 TPD of suspended solids to the River.

For the No. 2 Seamless Mill, there are 27 scale settling pits located throughout the mill all of which discharge to a common sewer system. Each of the scale pits contains a removable scale bucket which is emptied when full. These scale pits are reported of two sizes: 21 pits are 5'-9" x 4'-9" x 5'-6", and 6 pits are 4'-3" x 3'-3" x 5'-0". Some of the pits are arrayed in groups of two, three or four. Design flow was given as 4.9 MGD.

Total waste flow for the 002 sewer was estimated by Weiskircher as 4 to 6 MGD, averaging about 4.5 MGD. The 002 sewer drains into Settling Basin "A" built into the side of the River. This basin has gross dimensions of 150 ft x 20 ft x 13.5 ft deep. Net dimensions are 100 ft. x 20 ft. Design flow has been given as 3.454 MGD producing a waste detention time of 75 minutes. At the prevailing flow of 4.5 MGD (average), D.T. is calculated as 58 minutes. The Basin has a single influent and a single outlet as depicted below.



Various data provided by USSC to the State of Pennsylvania around 1966 in preparation for the State Industrial Waste Permits commented that design and operation of proposed Basins A, B and C (the three basins are nearly all the same size) would provide a form of secondary treatment to already-existing primary treatment processes inside the Mill.

In cleaning the Basins of solids, a hydraulic dredge was proposed. Sludge was to be pumped to a river barge moored alongside the basin, the pumped wastewater allowed to settle, and excess water from the barge returned to the influent end of Basins A, B or C. Dewatered sludge would be directed to an approved dumping site. Extensive cleaning by clam shell is conducted every 6 - 12 months. More limited scavenging is carried out every 4 to 8 weeks.

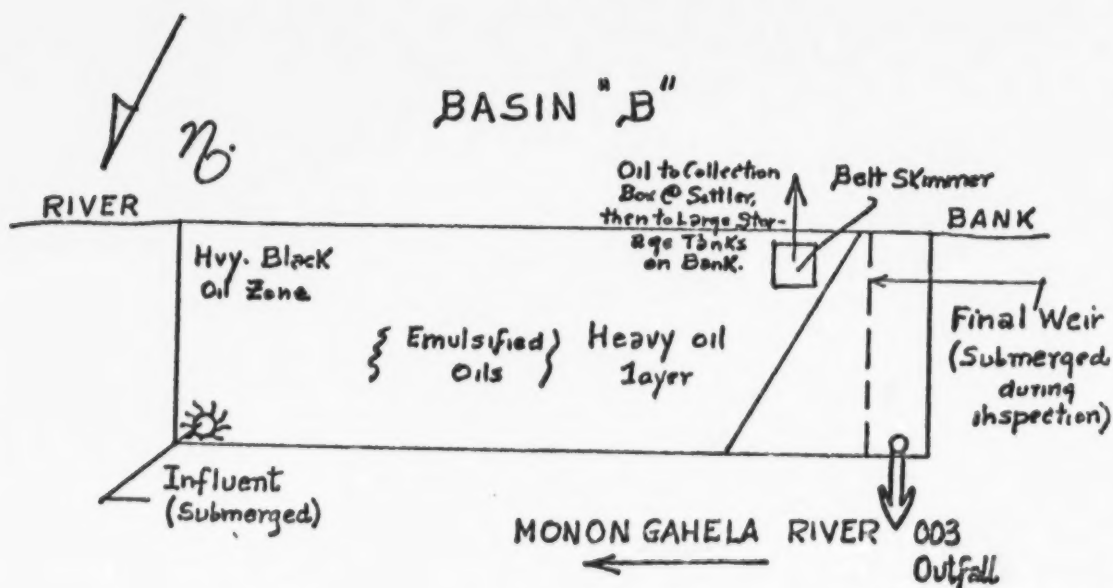
In removing oils from the Basin(s), a floating log baffle held in place with counter-weighted cable stays was to be installed at an angle of 45° near the effluent end of the basin. Accumulated oils were planned to be drawn up and onto a neoprene belt skimmer with a predicted removal rate of 40 gallons/hr. The oils/greases were to be lifted vertically out of the Basin. Plastic scrapper blades were designed to scrape the collected oils into troughs, the oil to be temporarily stored in a 900 gallon tank situated at/on the Settling Basin itself. When the holding tank is full, a 60 gpm sludge pump was designed to transfer the waste oil to a 12,000 gallon storage tank on the River bank. The entire system was to be steam-heated for wintertime functioning. Oil recovery rates from the above system, i.e. Basin A, were designed to average about 97 gallons per day.

On September 24, 1975, the day of our field inspection at National, highly significant amounts of oil were observed on the surface of Basin "A" both black and of the milky, emulsified forms. USSC indicated flows in the 002 sewer have been measured using the lithium chloride method and also by applying the Manning equation on the inflow pipe to the Basin. Judging by high-water marks on the Basin, the River can and does largely inundate Basin "A". The week of September 23, 1975 was very wet causing the River to rise 5-6 ft. above normal. Since the effluent trough is only about 1.5 feet above low River water mark, the effluent trough leaving the Basin into the River was submerged and under 3-4 ft. water. The Company normally collects their 002 samples at the end of the effluent trough. We asked USSC personnel where they would sample if mandatory on September 24. Their answer was from the basin proper. A heavy zone of emulsified oil was observed leaving the Basin with the discharge. Further data obtained from Weiskircher the week of September 23 indicated current oil removal rates from Basin A of 2,000 to 3,000 gallons/month. A single belt skimmer was existing and running as determined from direct observation. The Company almost always samples 002 as the final effluent from Basin "A". Oils from the Basin are transferred to a pair of 50,000 gallon(each) waste oil storage tanks atop the River bluff in the vicinity of Basin "B" (003 Outfall) or to a single 50,000 gallon oil storage tank in the proximity of Basin "C" (010 Outfall). This oil is reported as eventually being added to coal entering the Clairton, USSC coking batteries.

003 Outfall and Huey Storm Sewer

Current Seamless Mill Production was described by Johns and Weiskircher as 2 turns per day for the No. 1 Seamless Mill, but the No. 2 Seamless Mill (principally situated on the 003 sewer) serving only on a standby basis. The No. 1 Mill was described as "active", and No. 2 as not. Overall Seamless Pipe production at present time would seem to be in the range of 1,000-1,200 TPD. These figures are considered tentative pending Company verification.

USSC personnel stated that the Huey Street Storm Sewer which in essence is also the 003 sewer, runs directly through the Settling Basin "B" to the River. That portion of the east-west Seamless Mill main sewer contributing to the 003 sewer was estimated by the USSC personnel as approximating 5.5 - 6.0 MGD. Steel explained they thought all flow in the Huey Street sewer was their flow. Many scale pits are available on these lines mostly of the small 4' x 5' size which are cleaned perhaps once a turn. Rather than one or two tie-ins to the 003 sewer, there are probably several connections. The single influent to Basin "B" is reported to be always under water, i.e. the inlet is below low water level in the Mon River. National personnel report that lithium chloride flow measurements are being made weekly. Indications were also given that there may be crossover waste flows from the 002 sewer to the 003 outfall. Basin "B" has a single belt skimmer which was operational during our inspection. Weiskircher verbally reported an oil removal rate of 2,000 to 3,000 gallons monthly. This compares to an oil recovery design rate of 96 gallons/day stipulated in USSC materials provided to the State in the early 1960's. Gross dimensions of Basin "B" have been given as 150 ft x 20 ft x 15 ft deep. Net or effective dimensions are 100 ft x 20 ft x 13.5 ft deep. Design flow was expressed as 4.88 MGD which equates into a waste detention time of 60 minutes. A schematic of Basin "B" is depicted below. Configuration of various scale pits tied into sewer 003 and Basin B are shown in an enclosed figure to this report. The single belt skimmer on Basin B appeared to be taking relatively little oil. The Company reports use of lithium chloride "a couple of times" for flow measurement with estimates of flow being made at other times. USSC samples via drop bucket the final effluent leaving through the wall of the settling basin. If the final weir is submerged (by the River) as very definitely was the case during our inspection of September 24, 1975, the Company then samples from the interior of the Basin. The effluent weir in Basin B is unfortunately only 1.5 ft above low River stage. Very heavy amounts of black floating and emulsified oil were observed over the surface of the Basin.



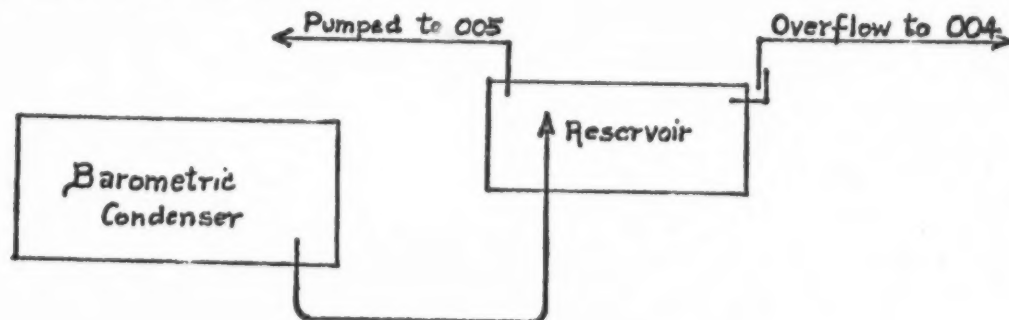
State data of the early 1960's showed that scale pits on the 003 system appeared capable of removing 37.7 TPD gross solids out of a total of 40 TPD for a 94.3% TSS recovery. Subsequently, Settling Basin "B" was reported capable of reducing TSS from 112 ppm ~ 2.28 TPD down to 62.3 ppm or 1.26 TPD. Overall solids removal efficiency was computed by the Company equivalent to 96.9%. The effluent is said to contain less than 30 ppm oils and 61 mg/l TSS = 1.26 TPD for the 003 final discharge. The recorded flows for 003 in the draft NPDES permit and in USSC's 95-5 data presentation range from 4.9 to 5.9 MGD which are less than flows given during the EPA, September 1975 inspection.

Concerning the Huey Street storm sewer, we were unsuccessful in locating any upstream manhole or equivalent for purposes of establishing background control for USSC waste loads. Further contact will be necessary with municipal officials of McKeesport.

Outfall 004 and No. 1 (Booster) Pump Station

004 is a relatively minor outfall reported as capturing cooling water from a booster water pumping station. This flow approximately one-half MGD and discharging untreated to the Mon River. The pump station containing three pumps is located directly between the Seamless No. 2 Mill and the Main Power Plant at National. A transformer complex was seen both NW and NE of this pump station. USSC reported that the Armstrong Street storm sewer ties into the 004 waste line which had not been previously reported to EPA, Region III. However, USSC has not viewed the storm sewer per se anywhere on their plant property. Associated with the Booster Pump House are 5 air compressors each of which have cooling water discharge (from intercoolers and after-coolers on these units). Four are Sullivan air compressors which discharge

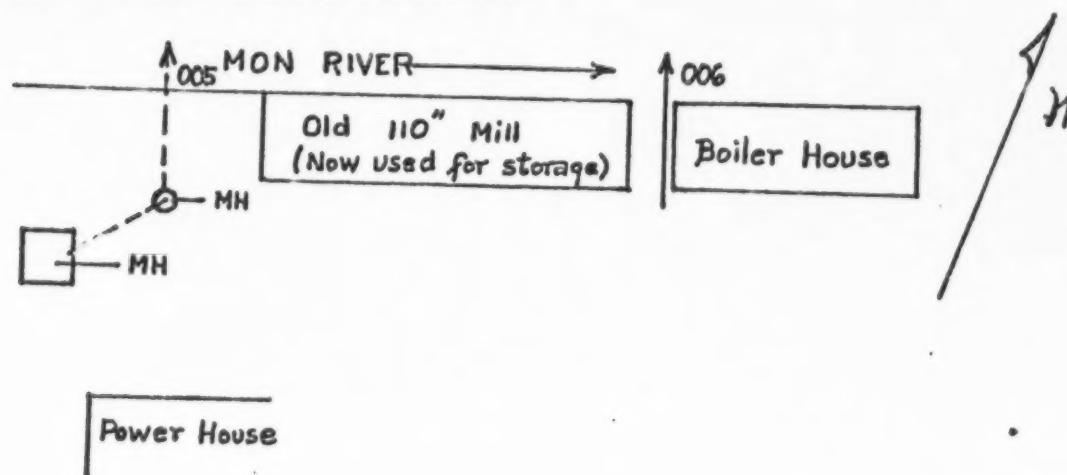
to the 005 sewer rather than 004. The fifth air compressor does discharge to the 004 sewer. Additionally, cooling water from one or two air compressors at the adjacent Power House is diverted over to the 004 sewer. USSC personnel furthermore believe there is a probable connection between a tailwater sump or reservoir serving the Power House, the overflow from which may find its way to the 004 sewer (See sketch below). The Company ordinarily samples 004 at the River but frequently when the River level is up, will sample the subject sewer at a manhole about 40 yards up on the line. Lithium chloride addition is also made at this latter manhole and measured at the River in order to ascertain flow. Lithium chloride can also be added at upstream air compressors. This MH is situated directly NE of the No. 1 Booster Pump House. No process flows are believed present in 004. During our inspection, the River was high and the terminus of 004 with the Mon River was submerged. A series of barges, i.e. nine, were moored at the end of the 004 sewer, making viewing difficult. The draft NPDES permit materials describe 004 as approximating 0.47 MGD. This compares to 1.20 MGD in subsequent USSC correspondence to EPA, Region III, and up to 8.0 MGD given us by Weiskircher the week of September 23, 1975 for 004.



005 Outfall - Intermittent Power House Effluent.

Intake for the National Plant power house is situated a short distance upstream of the 005 Outfall. USSC reports this intake is used very infrequently. In 1975 so far this intake has been used only two weeks. 005 represents barometric condenser cooling waters from a 10,000 KW turbine-generator, plus air compressor discharges from the Booster Pump station. Steel personnel said power generated internally at this power plant is 25 cycle, and not easy to use, so the power plant is operated sporadically. Lithium chloride has been added to the 005 line to determine flow. Two manholes are available as illustrated on the following page. Lithium chloride has been added twice to the MM closest the River. We were told the 005 sample is always taken at the River (via drop bucket) but only 2 such samples have been taken to date. The 005 line was judged to be not running and submerged during our inspection. The draft NPDES support materials give flow for 005 as 0.50 MGD.

On June 21st during the EPA boat run down the Mon River, the 005 outfall was about half above and half below water.



Martin Street Storm Sewer.

This sewer discharging into the Mon River between Outfalls 005 and 006, could not be found and is very probably submerged at the River. Size of this sewer has been previously given as 40 inches x 25 inches. Steel reports that connections from their plant to this sewer are highly unlikely.

006 Outfall from West Side of Central Boiler House

The 006 sewer from the Central Boiler House intersects the River at the sidewall directly below the coal hoist. There was some question among Steel personnel whether the Martin Street storm sewer may or may not intercept the 006 outfall, but we think not. The 006 sewer has in the past been sampled at the end of the pipe as reported by USSC. However with high river stage such as we experienced on September 24, the Company would undoubtedly sample at the first manhole from the River. This manhole is situated between the Boiler House and the 110 inch(old)mill on the west side of the Boiler House. The 006 outfall at the River was submerged during our 9/24 inspection. On 6/21/75 during the EPA river boat run, the 006 outfall was almost completely above the level of the Mon River. An "006" sign marks the spot of this sewer at the River; there is additionally a "1905" stamped into the River wall above this outfall. Our observations of September 24 were made off an antiquated "tug mover" stationed directly in front of the 006 outfall at River level.

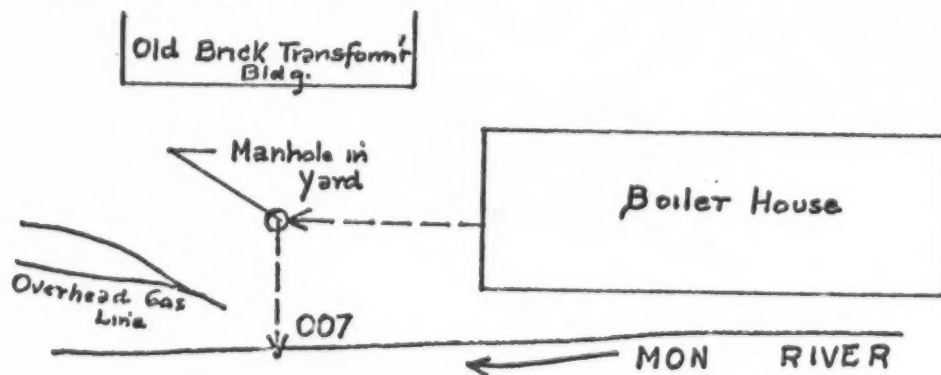
USSC indicates the 006 spent flow is made up entirely of NCCW from the boiler house. The cooling waters originate from pumps, compressors and other appurtenances which need to be cooled with water. Five boilers are available

but only 3 or 4 boilers are operational under normal circumstances. Waste flow for 006 has been hitherto given as 0.75 MGD although Weiskircher indicated this line could easily run 5.0 MGD or more. To the east of the Boiler House is located a 90 ft. diameter Walker thickener now abandoned. In the 1960's, blast furnace gas was being burned in the boiler house as a primary fuel and before burning was receiving cleaning via two Freyn gas washers and two Koppers precipitators. Flue dust particles were captured in wash waters which were sent to the Walker thickener for treatment. The boiler house now utilizes a mixture of blast furnace gas, natural gas, coal or various blends.

007 Outfall from East Side of Central Boiler House

The 007 Outfall is reported as the smallest of the two sewers originating from the Central Boiler House but certain observations indicate it may be the larger of the two. The 007 outfall was the only waste line on September 24, 1975 free flowing (and not submerged) into the Mon River. The line entered the River about 70 yards east of the coal hoist and NW of Blast Furnace No. 1. USSC samples this flow once per month via drop bucket at the River. The terminal flow on September 24 was observed whitish in cast and very hot. An extremely warm flow was also observed from aerial photos taken by EPA, NERC-Las Vegas on September 24, 1974 of this outfall; flow appeared considerable on the latter date.

Steel reports that 007 contains the blower house blowdown. From a material balance they have estimated 007 at 300,000 gpd. The draft NPDES support materials provide a flow of 0.45 MGD for 007. When the 90 ft. diameter Walker thickener was operational it was discharging into 007. The dye dump point and possible upstream sampling station for 007 is a manhole location just east of the boiler house shown below.



Center Street Storm Sewer.

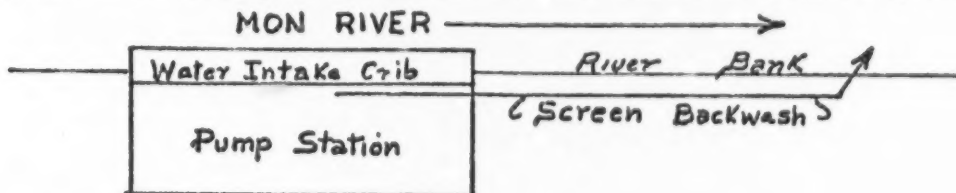
This sewer is located between Outfalls 007 and 008 and is also upstream of the Water Intake Works at National. Size of this sewer is defined as being 24 inches in diameter. We could not visually locate this line which very much

appeared to be submerged at its juncture with the Monongahela River.

National Water Intake Works

Three pumps for bringing Mon River water into the National Plant are located inside the water intake structure building on the River bank and three more water pumps are inside the Blow House approximately 200 ft. south of the river pump house. The three pumps at the River pump house intake are each electric and rated at 25 MGD. The three pumps in the blowing room are steam-driven and these are of different sizes being rated at 40 MGD, 20 MGD, and 15 MGD. USSC prefers to operate most of the time with one electric and one steamer. On September 24 during our visit the 40 MGD steamer was operational giving a theoretical total intake of 65 MGD; total actual River water intake during our inspection was running around 58 MGD. City water intake to the National Mill accounts for an additional 1.0 to 1.1 MGD but the latter figures must be verified. Within the mill proper USSC reports a number of water meters may be available including a city water meter; their locations are, however, so far not known.

The pump house has two travelling screens. Backwash off the screens was observed to be more or less continuous and comprising a significant flow. The backwash is conveyed in an overhead channel along the top of the River bank a short distance downstream before cascading into the Mon River as depicted below. This discharge would appear to represent either an illegal or an unauthorized discharge. The screen backwash should be relatively easy to sample



and gage within its discharge channel. The Company samples the intake for NET NPDES waste load calculations at the River in the crib between the log boom and the River wall. Inside the pump station, only the No. 2 pump was operational of the three pumps available. Venturi meters plus manometers are reported present on each of the pumps; Bristol instantaneous readout meters were observed on each pump. The No. 2 pump can be sampled on the discharge side via a stopcock on the vertical riser. The meter on No. 2 pump was reading 23 MGD during our inspection. We noted a fourth meter was present for a fourth pump which apparently had been pulled some time ago. The three steam-driven water pumps at the blow house each have continuous flow recorders (using orifice plates). The recorder for the 40 MGD pump is below the main floor level; it was reading 35 MGD during the visit. Recorders for the other two units are on the main floor. From this sector, water is sent to various parts of the National Plant. Boiler-feed water treatment is rated at 600,000 to 800,000 lb/hour feedwater. There is no reuse or recycling of boiler conden-

sates. The water treatment plant is located directly south of the Central Boiler House. Treatment consists of the hot soda ash process followed by anthracite filters followed by deaeration. Sludges from the hot soda process and filter backwashes are mixed with various "dirty water flows" and together with boiler blowdowns are discharged to the Mon River via Outfall 007.

Outfall 008 From Blowing House and Excess Cooling Waters Off Blast Furnaces

Spent flows in 008 originate primarily as steam condensed by a Wise barometric condenser at the blow house. Total flow was specified by Weiskircher as around 8-12 MGD although the NPDES permit materials specify only 7.9 - 8.0 MGD. The correct flow was said to be likely close to 12 MGD. Blast Furnaces Nos. 2 and 4 as also Dorr thickeners connected to these two blast furnaces are not in use and according to USSC personnel are not likely to ever be used again. The No. 1 Blast Furnace now devoted entirely to FeMn production, is the single remaining unit in this circuit. Cooling waters off the No. 1 Blast Furnace go both to Outfall 009 and as barometric makeup at the above-mentioned blow house. Excess at the blow house ends up in the 008 sewer. An additional 3-4 MGD makeup water is supplied to the Wise barometric to condense steam in the blow house. Mostly because of imperfections in the blast furnace return lines, more cooling water goes to 009 than desired. The two 50 ft. diameter Dorr thickeners once serving the Nos. 2 and 4 Blast Furnaces are now completely down. The Nos. 2 & 4 Blast Furnaces have been closed since 1971. The Bessmer converters and once prevalent open hearths were discontinued at National about 10 years ago.

The 008 Outfall is ordinarily sampled by the Company at the River. The terminus of this outfall with the River was apparently submerged during our inspection of September 24, 1975. On June 21 on the EPA River boat run just the uppermost part of the 008 sewer was visible above River level. The 008 line can be alternately sampled at the hot well off the barometric at the SE side of the blow house (outside). This hot well is also employed as a lithium chloride drop point for the 008 line.

009 Sewer Draining Excess Spent Flows Off Blast Furnace Complex, and Part of Hot Saws at 32-Inch Bar Mill

The 009 sewer at its top end receives the White Street storm sewer but nobody seems to know where the storm sewer connects with the 009 line. The proposition was made that the storm sewer connection was immediately SE of the 50 ft. diameter No. 4 BF thickener but after inspection of manholes, no conclusions were possible. Excess cooling waters from Blast Furnace No. 1 enter 009, and a manhole was found for separate sampling of the Blast Furnace excess flows, if so desired.

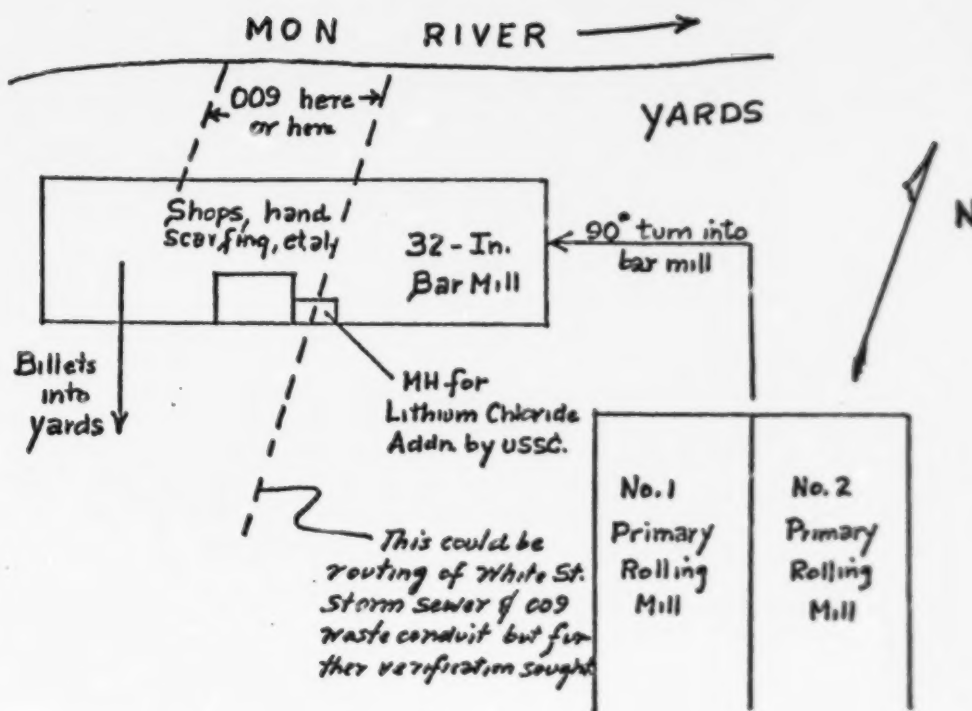
The No. 1 or ferromanganese Blast Furnace is notable because wet gas cleaning on this furnace which is the only one currently operating at National,

is reported as completely recycled. FeMn production is presently in the range of 600 to 1000 TPD. Blast Furnace No. 1 is equipped with a dry dust catcher followed by a Venturi scrubber followed by a cooling tower (the latter primarily for gas rather than water cooling). The Venturi scrub flows passing through 110 ft. diameter thickener (used for treating these scrub effluents) were cited by Weiskircher as around 1.25 MGD. The gas cooling tower (3rd stage) is said to remove little dust because the gas stream entering this unit is already down to .01 grains/SCF. The Venturi effluent et. al. after leaving the 110 ft. diameter thickener flows to a small adjacent box from which the treated water is pumped back to the Venturi and cooling tower. A dispersing agent is reported to be added at the Venturi and a flocculating agent at the thickener. Underflows are passed to a vacuum filter and these solids eventually find their way to landfill via truck.

At National, the FeMn is cast into beds, the material hardens and is then fractured. FeMn is essentially an additive for higher-grade steels whether made at the Duquesne Plant or other USSC plants. The BOP shop at Edgar Thompson is also a likely recipient of this FeMn. The FeMn receives classification and/or sorting before being transported elsewhere although this sizing may be carried out at Duquesne rather than National. Slag from the FeMn Blast Furnace No. 1 is drawn off into a dry slag pit at National. We observed a rather large assemblage of now abandoned air pollution control equipment which was the former National Gas Cleaner System apparently used for Blast Furnaces 2, 4 and possibly 3 when the latter were going strong. USSC is contemplating conversion of this system to scrap.

The 50 ft. diameter thickener reported as once upon a time serving the No. 4 Blast Furnace was receiving inflow during our inspection although the thickener appeared to have no overflow. Weiskircher appeared to show great surprise that this unit could receive any flow. He said it was the first time he had ever witnessed flow into this thickener. Some pumping of accumulated storm flows from the yards may have been occurring.

We were slightly surprised as to bar mill hot saw process effluents being present on the 009 sewer line. Three or more scale pits (3'-6"x 3'-6" x 2'-9") and two (7'-0"x6'-0" x 1'-11" pits) are available following the hot saws. A schematic layout showing the lithium chloride manhole used by Steel for measuring 009 flows is given on the following page. USSC is presently obtaining more accurate flow measurement on the relative contribution of the hot saw flows. The MM is inside the 32 inch bar mill just SE of the hot saws. Design flow from the hot saw sector is 1.25 MGD. Most of this flow is directed to 009 with some unknown portion going to 010.



The 009 Outfall intercepts the River directly to the rear of the billet-bar mill complex. On September 23, 1975, this outfall at the River was completely submerged. September 1974 and June 21, 1975 photographs taken by EPA show this outfall to be one of the more significant at National. During the June 21, 1975 EPA river boat run, the 009 outfall was about 1/4 out of water and approximately 3/4 submerged. The 009 Outfall from draft NPDES permit materials was estimated to have a flow of 2.3 - 12.5 MGD. Weiskircher during the week of September 20, 1975 indicated a probable flow of 5-6 MGD for 009 but indicated further that process and cooling water flows could easily attain and exceed 10 MGD. The 009 outfall is believed sampled by USSC by drop bucket off the end of the sewer. Considerable uncertainty still exists as to disposition of the White Street storm sewer. Contact will be made with Don Glenn of the City Engineer's Office of the City of McKeesport to possibly secure pertinent details and break down the role of storm sewers traversing the USSC, National Plant property.

In the 32-inch bar mill, the billets after being formed are cooled in the yards. The pieces are subsequently passed through three peeling machines. This process enables the exterior surface to be peeled off to the extent of 1/16 - 1/4 inch. A given portion of the billets, bars, rounds are brought back into the mill for selective hand scarfing, a procedure otherwise known as "filling in the seams". The 32 inch bar mill is equipped with a "centrally-located" scale pit which actually has two compartments. The first compartment

is described as 20 ft x 10 ft x 4 ft - 6 in SWD and the second as 4 ft-6 in x 10 ft x 4 ft - 6 in SWD. Based upon a design flow of 2.6 MGD, detention time is 3.8 minutes. It is noted most of these flows are diverted to the 010 sewer rather than the 009 outfall. The 32-inch bar mill as also the No. 1 Bloom-Billet mill(s) generally operate 2 turns per day. Product of the bloom-billet-bar mill complex is usually in the range of 4 1/2 inch rounds up to about 13 1/2 inch rounds. National can also roll rounds for the Gary, Indiana and Lorraine, Ohio, USSC mills. Occasionally blooms and slabs may also be turned out for use by the Clairton USSC finishing mills.

Outfall 010 - Sinter Plant Effluent (Currently inoperative), Nos. 1 and 2 Bloom/Billet Mills and Remaining Portions of 32-inch Bar Mill; Terminal Settling Basin "C"

The National Sinter Plant establishment has been down since April, 1975. Gas cleaning scrubbing flows from the sinter plant ordinarily receive treatment in a 20 ft. diameter thickener with the overflow going to 010 and the sludge underflows being screened in a Dorr Oliver vacuum filter and the de-watered solids eventually transferred to the ore yard. State Permit Application 463142 indicates the thickener overflow is discharged to the River whereas Weiskircher in September 1975 described gas cleaning from the venturi as comprising a closed circuit. We could not verify specific conditions because the sinter plant was not operational and we did not manage to get into proximity of the sinter plant during our inspection. Design flow for the sinter plant thickener has been previously given as 50 gpm ~ wastewater detention time of 5.9 hours but Weiskircher indicated current process flows are now running 1200 gpm = 1.74 MGD.

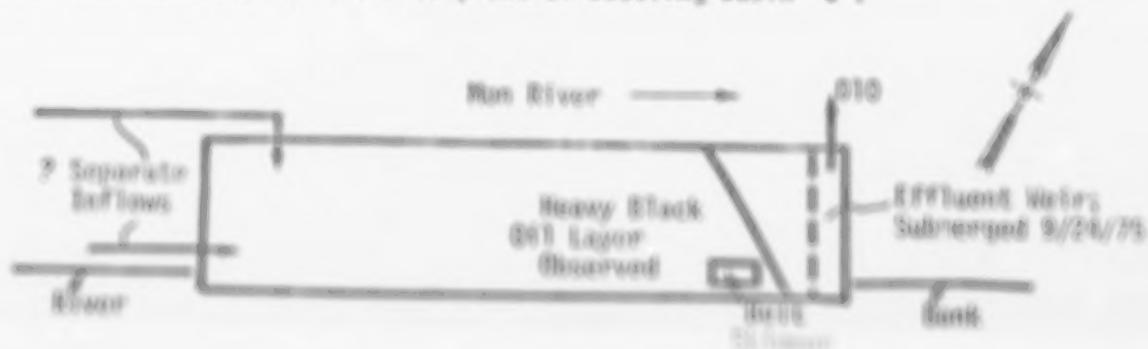
Configuration and type and duration of operations maintained in the Nos. 1 and 2 Bloom - Billet Mills and ensuing bar mill at National have been previously explained by this report. The Nos. 1 and 2, 40-inch bloom mills are both 2-high reversing mills and the bar mill is likewise reported as a 2-high reversing mill. Our inspection did not cover the bloom mills and was extremely limited through the bar mill.

The No. 1 Bloom mill has a single centralized, two-compartment scale pit adjacent to the primary mill. Compartment A is described as 16 ft x 16 ft x 3 ft-7 in and separated by baffle from Compartment B. The latter chamber is 16 ft x 6 ft-6 in x 3 ft-7 in, design flow for the No. 1 Mill scale pit was given as 8.9 MGD yielding a detention time through the scale pit of 1.5 minutes. This scale removal device is said to recover 43.44 TPD of scale leaving 1.93 TPD of TSS in the effluent. Calculated TSS removal is therefore 95.82.

The scale pit at the No. 2 Bloom mill is reported as 12 ft x 7 ft x 7 ft. Design flow was given as 8.9 MGD yielding a water detention time of 43 seconds at this flow. The No. 2 mill is said to operate only when the

No. 1 mill is inoperative or where relatively high production rates are experienced. The 32-inch bar mill has a centrally-located scale pit comprising a main pit followed by a discharge pit. The main compartment is 20 ft x 10 ft x 4 ft-6 in., and the discharge chamber 4 ft - 6 in x 10 ft x 4 ft - 6 in. Design flow was cited as 2.6 MGD yielding a waste detention time of 3.8 minutes. Scale removal via this scale trapping facility was described as amounting to 16.56 TPD. Effluent TSS was said to be 0.95 TPD ~ 88 mg/l TSS thereby providing a TSS removal efficiency in the order of 94.6%. All of the various scale pits (small and large) leading into the O10 sewer and to Settling Basin "C" are depicted in an enclosed sketch to this report. Total flows on this circuit are around 8.9 MGD (Bloom mills) plus 2.6 MGD from the bar mill together with 1.74 MGD from the sinter plant, possible effluent from the bar mill hot saws and other undefined. This total of 13.2 MGD compares to 7.50 MGD given in the earlier NPDES draft materials which was later modified by USSC down to 5.87 MGD. Weiskircher during our inspection of the week of September, 1975 did indicate however that O10 flows can easily run 10 MGD and up to and beyond 12.0 MGD. Maximum theoretical production capacity for the Nos. 1 and 2 primary mills and the 32-inch bar mill was given in the NPDES draft permit as 5,600 TPD which should be re-verified. No production figures have been received on the National sinter plant.

The terminal Settling Basin "C" placed on the River bank but actually jutting out and within the Mon River, has overall dimensions of 150 ft x 20 ft x 15 ft. deep. Effective dimensions are given as 100 ft x 20 ft x 13.5 ft. deep. There are two inflows into Basin C as depicted in the sketch below. At the Basin design flow, estimated waste detention time has been estimated in the order of 25 minutes. This basin is provided with a single belt skimmer and collection box similar to Basins A and B. Specs call for oil recovery rates of 363 gallons/day from this device; Weiskircher reports 4,000 gallons oil recovered monthly. A sign on the Settling Basin indicates that high River stage in the past has completely covered the upper catwalk and the entire settling chamber. During our inspection of September 24, the final takeoff weir in the basin was submerged below the River level. During the EPA river boat run of June 21, 1975, the effluent weir was approximately 1.5 to 2.0 ft. above River level. Freeboard is thereby minimal. Heavy black oil was observed on the surface of Basin "C" during the September 24, 1975 inspection. The Company samples the O10 Outfall at the very end of Settling Basin "C".



Additional design criteria for Basin C has predicted with an influent loading of 67 mg/l TSS that approximately 1.56 TPD of TSS will be settled and recovered. With these conditions, effluent was expected around 38 mg/l. USSC currently adds lithium chloride for flow determination on the 010 waste collection network.

Crooked Run Storm and Other Drainage

Crooked Run is a natural drainway intersecting the Mon River at the lower end of the USSC, National Plant property roughly 150 yards upstream of the high-level McKeesport car bridge. Besides storm runoff, we are fairly certain that there is sanitary sewage bypass into Crooked Run. The outfall coming out of the River bank was observed during the EPA river boat run of June 21, 1975. However this sector was completely submerged by high water on September 24, 1975. Significant discoloration has been noted at the point where Crooked Run enters into the Monongahela River. Entrance flows and characteristics are unknown.

SUGGESTED SAMPLING POINTS FOR PROSPECTIVE NEIC FIELD SAMPLING
OF USSC, NATIONAL STEEL MILL, MCKEESPORT, PA.

Primary Locations

- 001 at Box Manhole on Locust Street (i.e., Company sampling point) (1)
- 002 at influent to Settling Basin "A" (2)
- 002 at final discharge from Settling Basin "A" (2)
- 003 at final discharge from Settling Basin "B" (2,3)
- 006 Outfall at River (2)
- 007 Outfall at River (2)
- 008 at hot well of Blow louse (1)
- 009 either at River or a upstream manhole (1)
- Water works Intake off dscharge side of No. 2 Pump
- Combined Screen Backwashoff National Water Intake
- 010 at final discharge from Settling Basin "C" (2)
- Crooked Run at point of lischarge to River (2)

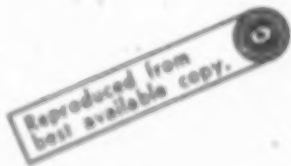
Secondary Locations

- Walnut Street Storm Sewer
- Market Street Storm Sewer
- 004 Outfall at River (2)
- Armstrong Storm Sewer at top end of 004 Outfall
- 005 Outfall at River (2)
- Martin Street Storm Sewer
- Center Street Storm Sewer
- White Street Storm Sewer entering the top end of 009
- Crooked Run upstream of SSC property.

- (1) This outfall at River normally submerged in part or all.
- (2) This sampling point or outfall not affected by River stage during unusually dry weather.
- (3) Stormwater sampling control poles here not yet been found.

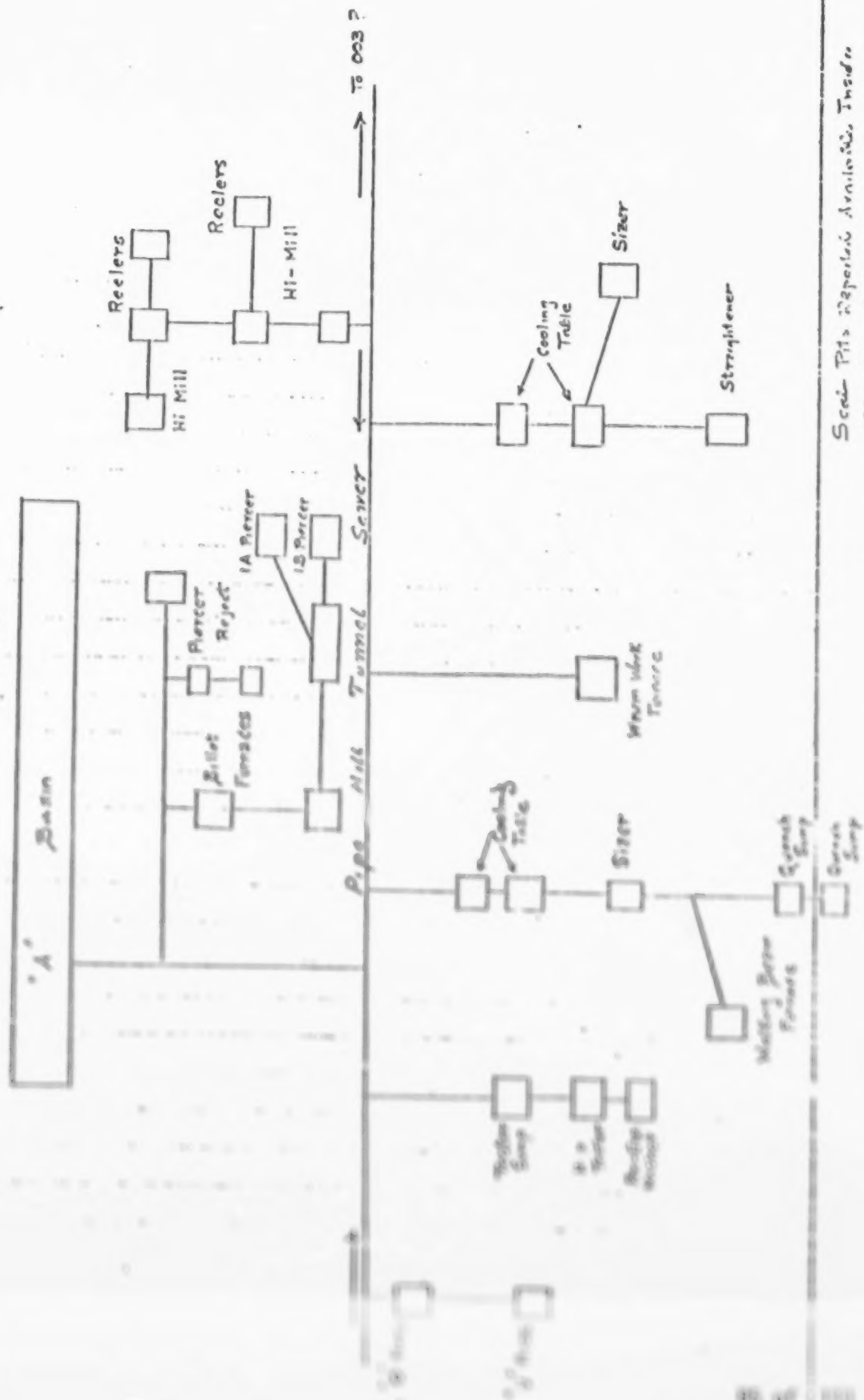
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Dugessia Plant

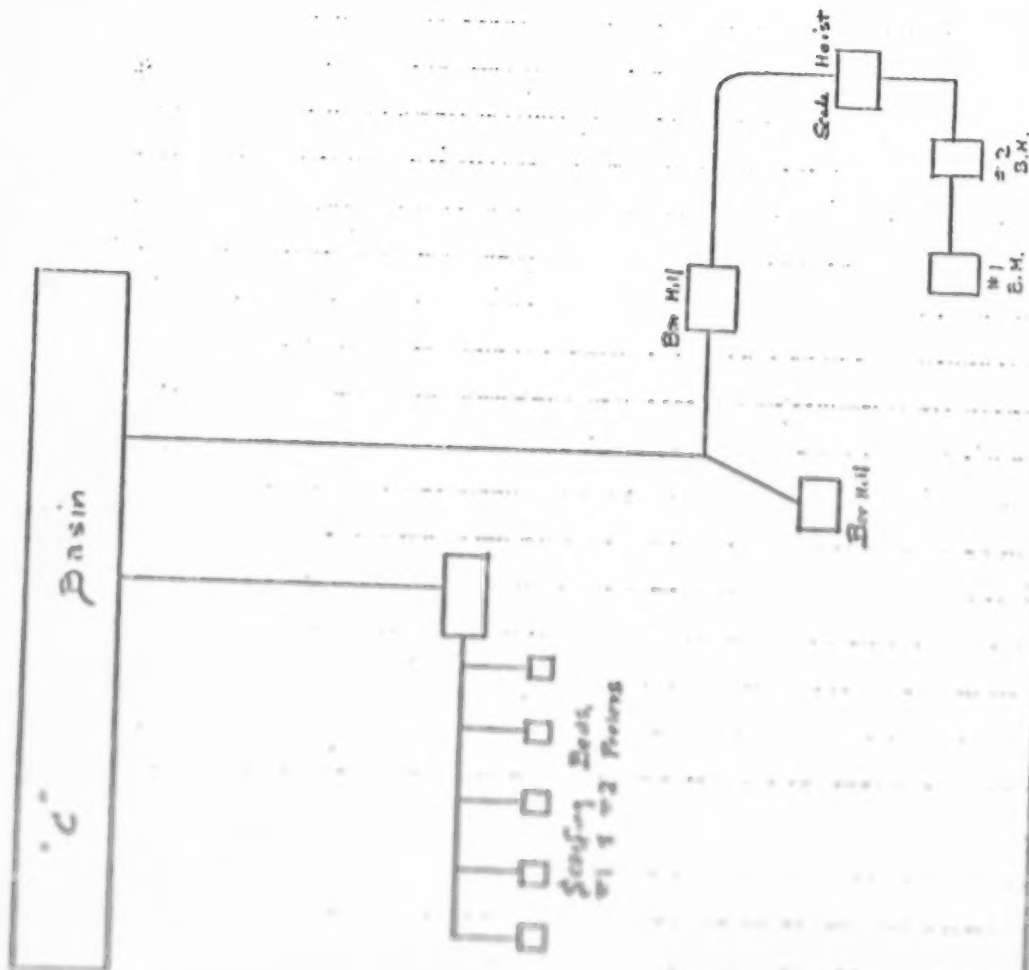


Water & Power



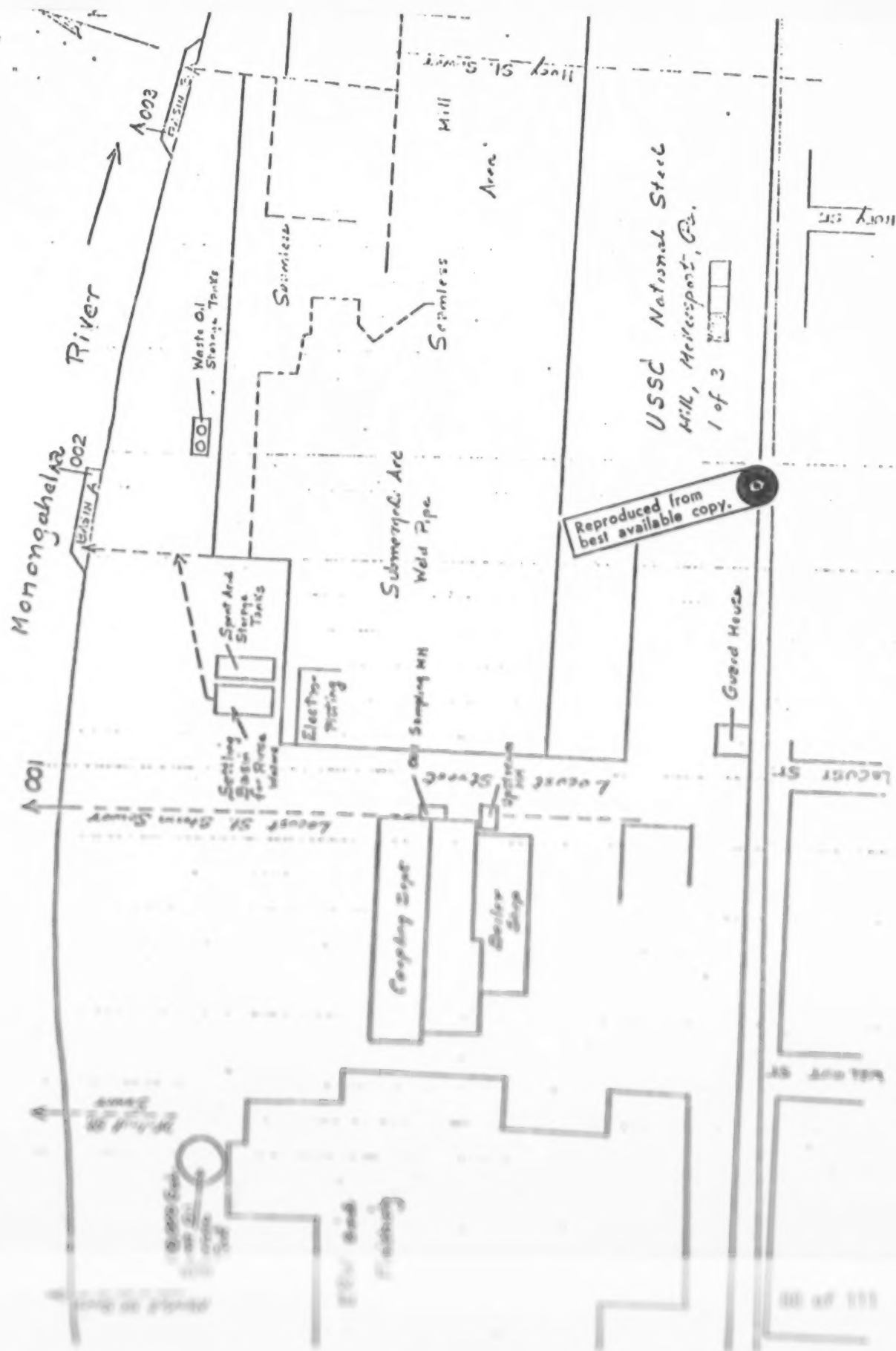


See P11s Report to Admin. Ins. Inside
USMC N. American on 002 S. 1000 S. 1000.
Data provided by USA, West of 9/12/75.



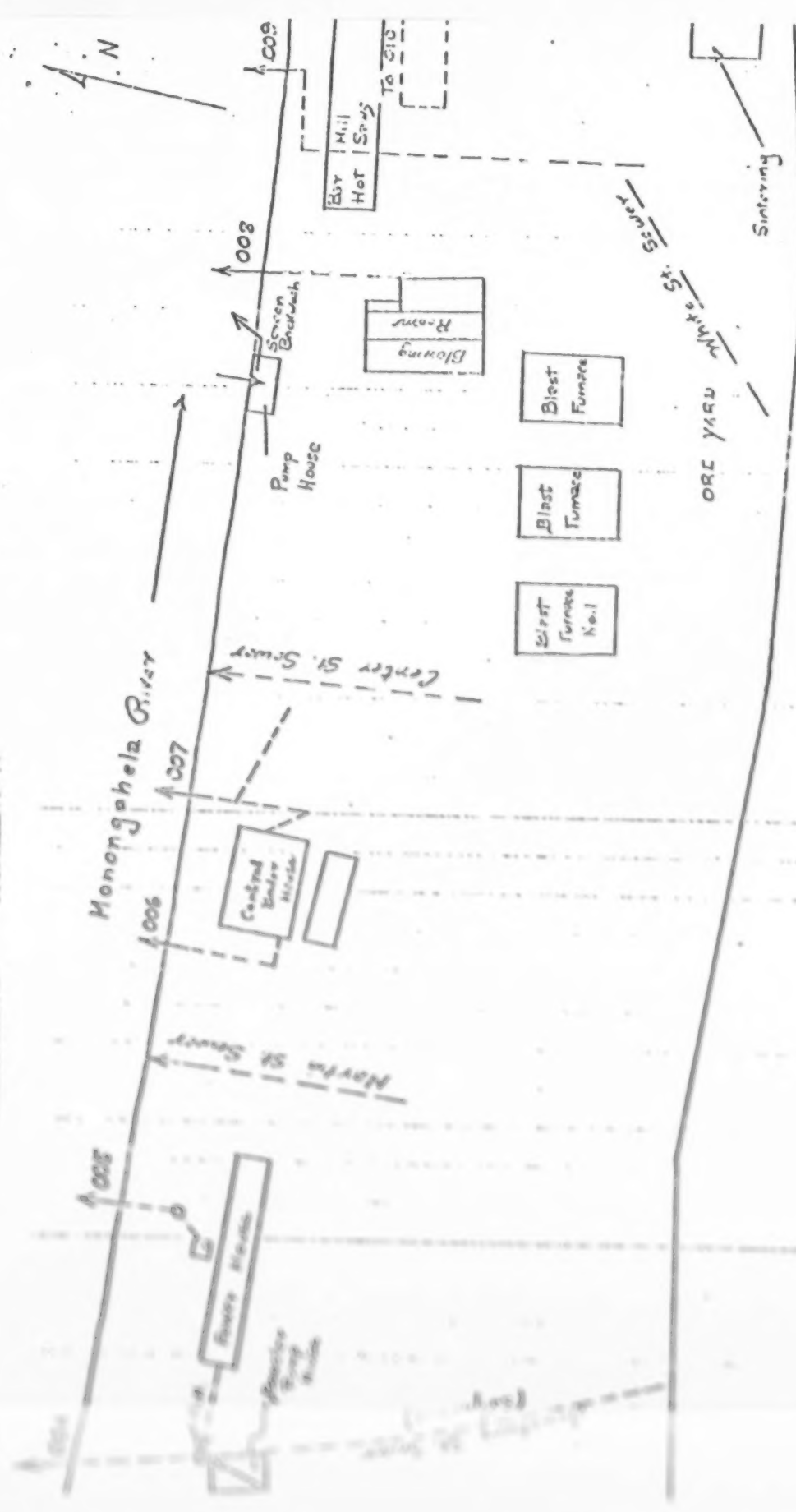
Scale Pts Reported Available Inside
 USSC National Plant on CIO Survey System.
 Data Provided to EPA, Week of 6/10/75.





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USSC National Steel
Mill, Hefengpo, China.
1 of 3



USSC National Steel
 Hill, Mc Kersport, Pa.
 2 of 3

W. St.

Center St.

Main St.

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USSC National Steel
Mill, McKeessport, Pa
3 of 3

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Appendix B
FIELD STUDY METHODS

FIELD STUDY METHODS

FLOW DETERMINATIONS AND MONITORING LOCATIONS

Due to the high river stage from winter snows and rain, all outfalls except 007 were under water. USSC personnel have established alternate sampling locations upsewer of the river locations, however, flow measurements cannot be made at the alternate sites and USSC personnel are not certain if all wastewater discharged at the river outfalls also flows through the alternate sampling locations. For these reasons, flow determinations were not conducted and only outfalls 001 and 007 were monitored. Additional monitoring included the river intake water, screen backwash water from the river intake, the influent and effluent to the ferromanganese thickener and the ferromanganese blast furnace excess cooling water overflow. A description of all outfall monitoring locations and alternate sites, and the additional locations monitored during the NEIC survey follows.

Outfall 001

The sampling location described in the NPDES permit is as follows: "Before discharging to Locust Street Storm sewer, to Outfall 001." For monitoring purposes, the Company always collects samples from the manhole at the northwest corner of the Coupling Tap Building, since outfall 001 is always under water. According to USSC personnel, this is the only access location which contains all wastewater prior to discharge to the storm sewer. USSC estimates the daily flow from an instantaneous flow determined with lithium chloride over a 5-minute period. The tracer is added at the manhole about 30 m (100 ft) upsewer of the monitoring location.

Samples of the wastewater were collected from the manhole at the northwest corner of the Coupling Tap Building during the NEIC survey.

Outfall 002

The sampling location described in the NPDES permit is as follows: "At the discharge from the settling basin to Monongahela River, outfall 002." USSC samples the wastewater in the effluent launder channel prior to discharge. There is no alternate monitoring location for outfall 002. The depth of water in the parabolic shaped influent pipe is determined and an instantaneous flow is calculated using the Manning formula. The total daily flow is calculated from the instantaneous flow. Lithium chloride has also been added upsewer by USSC to determine an instantaneous flow. The terminus of the influent pipe is above the basin water level.

Samples of the effluent from the settling basin could not be collected during the NEIC survey since the effluent launder was approximately 0.6 to 0.9 m (2 to 3 ft) under water.

Outfall 003

The sampling location described in the NPDES permit is as follows: "At the discharge from the settling basin to Monongahela River, outfall 003." USSC samples the wastewater in the effluent launder prior to discharge. There is no alternate monitoring location for outfall 003. The influent to the settling basin is under water. Lithium chloride is added upsewer of the influent pipe and samples collected from the upwelling for flow calculations. Total daily flow is calculated from the instantaneous flow.

Samples of the effluent from the settling basin could not be collected during the NEIC survey since the effluent launder was under water.

Outfall 004

The sampling location described in the NPDES permit is as follows: "At the outfall 004." The outfall is the terminus of the Armstrong Street storm sewer. USSC collects samples at the terminus when the river level is below the invert of the pipe. When the river level is above the outfall pipe, USSC personnel collect samples from a manhole adjacent to the transformers on the northwest side of the pumphouse, approximately 46 m (50 yd) upsewer of the river. Lithium chloride is added at this manhole for instantaneous flow measurement. Total daily flow is calculated from the instantaneous flow.

Samples of the discharge could not be collected during the NEIC survey since the outfall pipe was below the water surface.

Outfall 005

The sampling location described in the NPDES permit is as follows: "At the outfall 005." The outfall is located at the river and USSC monitors at this location whenever there is a discharge. There is no alternate monitoring location if the outfall is under water. There are two locations where a tracer may be introduced for flow measurement. The first location is the storage tank on the north side of the power house; the second location is a manhole east of the storage tank next to the transformer mobile poles. USSC personnel adds lithium chloride at the first location and determines the instantaneous flow from the concentration at the outfall. Total daily flow is computed from the instantaneous flow.

There was no discharge during the NEIC survey.

Outfall 006

The sampling location described in the NPDES permit is as follows: "At outfall 006." The outfall is located at the river. Under high river levels, the outfall is inundated and USSC collects samples from a manhole in the alley between the 110-in. mill and the boiler house. USSC personnel add lithium chloride at this manhole and determine the instantaneous flow at the outfall. Total daily flow is computed from the instantaneous flow.

The outfall was under water during the NEIC survey.

Outfall 007

The sampling location described in the NPDES permit is as follows: "At outfall 007." The outfall is always above the river surface and samples are collected at the river. Lithium chloride is added at a manhole on the east side of the boiler house; instantaneous flows are determined at the outfall.

During the NEIC survey, grab samples were collected from the outfall at the river once/day. Flows were not determined.

Outfall 008

The NPDES permit describes the monitoring locations as follows: "At the outfall 008." USSC collects samples at the river when the outfall is above the water surface. An alternate site is located on the east side of the blow building at the condenser water discharge. Lithium chloride is added at the alternate location and an instantaneous flow determined at the outfall.

During the NEIC survey, the outfall was submerged.

Outfall 009

The monitoring location described in the NPDES permit is as follows: "At outfall 009." The outfall is under water during high river levels; there is no alternate sampling location. USSC injects lithium chloride in a manhole adjacent to the hot saws inside the mill and determines an instantaneous flow at the outfall.

During the NEIC survey, the outfall was under water.

Outfall 010

The monitoring location described in the NPDES permit is as follows: "At the discharge from the settling basin to Monongahela River, outfall 010." USSC samples the wastewater in the effluent launder prior to discharge. There is no alternate monitoring location for outfall 010. The settling basin has two influents, both of which are visible only when the river level is below the effluent launder. Instantaneous flows have been determined by USSC personnel for both influents using lithium chloride.

During the NEIC survey, the effluent launder and both influents were under water.

River Intake

The plant is served by one river intake. USSC personnel collect water samples from the river after the bar screens and ahead of the traveling screens. Flows are measured by venturi meters and manometers on each of the three electric pumps at the river. Only one of the three pumps at the pump house is used during the week; the pumps are alternated every three weeks. There are three additional steam driven pumps in the

blow room. Only the 40 mgd pump is used; the 15 mgd and 20 mgd pumps are used for standby purposes.

During the NEIC survey, pump No. 1 in the pump house was operational. Samples of the river water were collected from the discharge side of the pump.

River Intake Screen Backwash Water

The traveling screens are backwashed directly to the river via an unpermitted outfall between the intake structure and outfall 008. USSC personnel do not monitor this discharge.

During the NEIC survey, grab samples were collected once/day from the discharge. Flows were not determined.

Ferromanganese Blast Furnace Thickener

USSC does not monitor the thickener since all wastewater is reportedly recycled. NEIC monitored the influent and effluent to determine treatment efficiency. The effluent was monitored at the overflow launder on top of the thickener. The influent samples were collected from the influent pipe after all contributory sources had mixed. The sampling location for the influent pipe was inside the blast furnace building.

Ferromanganese Blast Furnace Excess Cooling Water

USSC does not monitor the excess cooling water since it is included in the flow through outfall 009. NEIC sampled the excess cooling water from the manhole in the conditioning yard, next to an old thickener (not in use).

SAMPLE COLLECTION PROCEDURE

Twenty-Four-Hour Composite Samples

Beginning at 6 a.m. on February 3, samples were continually composited on an equal-volume basis every 2 hours for 24 hours for the river intake, ferromanganese thickener influent and effluent, and the excess cooling water discharge. Composite samples were analyzed for TSS, cyanide, ammonia and metals.

Grab Samples

Grab samples for oil/grease* and phenols were collected in 0.95 liter (1 qt) glass jars. Settleable solids were collected in 1.9 liter (1/2 gal) plastic containers. Grab samples for metals and TSS were collected in 1 liter cubitainers. Organics were collected in a 3.79 liter (1 gal) brown glass bottle and sealed with a Teflon[†]-lined cap.

Preservation

Due to the hazard associated with fixing samples which contain high concentrations of cyanide, all metal and O/G samples collected from the influent and effluent of the ferromanganese thickener were fixed with acid at the mobile chemistry laboratory located at the McKeesport Wastewater Treatment Plant. Phenols from the FeMn thickener influent and effluent were preserved only with sodium hydroxide in the field. All other O/G and metal samples were preserved with H_2SO_4 and phenols with $CuSO_4$ and H_3PO_4 in the field. Cyanide samples were preserved with sodium hydroxide in the field. No preservatives were used for the organic samples.

* Freon extractable material

† Trademark

APPENDIX C
Chain of Custody Procedures

ENVIRONMENTAL PROTECTION AGENCY
Office Of Enforcement
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
Building 53, Box 25227, Denver Federal Center
Denver, Colorado 80225

July 24, 1974

CHAIN OF CUSTODY PROCEDURES

General:

The evidence gathering portion of a survey should be characterized by the minimum number of samples required to give a fair representation of the effluent or water body from which taken. To the extent possible, the quantity of samples and sample locations will be determined prior to the survey.

Chain of Custody procedures must be followed to maintain the documentation necessary to trace sample possession from the time taken until the evidence is introduced into court. A sample is in your "custody" if:

1. It is in your actual physical possession, or
2. It is in your view, after being in your physical possession, or
3. It was in your physical possession and then you locked it up in a manner so that no one could tamper with it.

All survey participants will receive a copy of the survey study plan and will be knowledgeable of its contents prior to the survey. A pre-survey briefing will be held to re-appraise all participants of the survey objectives, sample locations and Chain of Custody procedures. After all Chain of Custody samples are collected, a de-briefing will be held in the field to determine adherence to Chain of Custody procedures and whether additional evidence type samples are required.

Sample Collection:

1. To the maximum extent achievable, as few people as possible should handle the sample.
2. Stream and effluent samples shall be obtained, using standard field sampling techniques.
3. Sample tags (Exhibit I) shall be securely attached to the sample container at the time the complete sample is collected and shall contain, at a minimum, the following information: station number, station location, date taken, time taken, type of sample, sequence number (first sample of the day - sequence No. 1, second sample - sequence No. 2, etc.), analyses required and samplers. The tags must be legibly filled out in ballpoint (waterproof ink).

Chain of Custody Procedures (Continued)

Sample Collection (Continued)

4. Blank samples shall also be taken with preservatives which will be analyzed by the laboratory to exclude the possibility of container or preservative contamination.
5. A pre-printed, bound Field Data Record logbook shall be maintained to record field measurements and other pertinent information necessary to refresh the sampler's memory in the event he later takes the stand to testify regarding his action's during the evidence gathering activity. A separate set of field notebooks shall be maintained for each survey and stored in a safe place where they could be protected and accounted for at all times. Standard formats (Exhibits II and III) have been established to minimize field entries and include the date, time, survey, type of samples taken, volume of each sample, type of analysis, sample numbers, preservatives, sample location and field measurements such as temperature, conductivity, DO, pH, flow and any other pertinent information or observations. The entries shall be signed by the field sampler. The preparation and conservation of the field logbooks during the survey will be the responsibility of the survey coordinator. Once the survey is complete, field logs will be retained by the survey coordinator, or his designated representative, as a part of the permanent record.
6. The field sampler is responsible for the care and custody of the samples collected until properly dispatched to the receiving laboratory or turned over to an assigned custodian. He must assure that each container is in his physical possession or in his view at all times, or locked in such a place and manner that no one can tamper with it.
7. Colored slides or photographs should be taken which would visually show the outfall sample location and any water pollution to substantiate any conclusions of the investigation. Written documentation on the back of the photo should include the signature of the photographer, time, date and site location. Photographs of this nature, which may be used as evidence, shall also be handled recognizing Chain of Custody procedures to prevent alteration.

Transfer of Custody and Shipment:

1. Samples will be accompanied by a Chain of Custody Record which includes the name of the survey, samplers signatures, station number, station location, date, time, type of sample, sequence number, number of containers and analyses required (Fig. IV). When turning over the possession of samples, the transferor and transferee will sign, date and time the sheet. This record sheet

Chain of Custody Procedures (Continued)

allows transfer of custody of a group of samples in the field, to the mobile laboratory or when samples are dispatched to the NFIC - Denver laboratory. When transferring a portion of the samples identified on the sheet to the field mobile laboratory, the individual samples must be noted in the column with the signature of the person relinquishing the samples. The field laboratory person receiving the samples will acknowledge receipt by signing in the appropriate column.

2. The field custodian or field sampler, if a custodian has not been assigned, will have the responsibility of properly packaging and dispatching samples to the proper laboratory for analysis. The "Dispatch" portion of the Chain of Custody Record shall be properly filled out, dated, and signed.
3. Samples will be properly packed in shipment containers such as ice chests, to avoid breakage. The shipping containers will be padlocked for shipment to the receiving laboratory.
4. All packages will be accompanied by the Chain of Custody Record showing identification of the contents. The original will accompany the shipment, and a copy will be retained by the survey coordinator.
5. If sent by mail, register the package with return receipt requested. If sent by common carrier, a Government Bill of Lading should be obtained. Receipts from post offices and bills of lading will be retained as part of the permanent Chain of Custody documentation.
6. If samples are delivered to the laboratory when appropriate personnel are not there to receive them, the samples must be locked in a designated area within the laboratory in a manner so that no one can tamper with them. The same person must then return to the laboratory and unlock the samples and deliver custody to the appropriate custodian.

Laboratory Custody Procedures:

1. The laboratory shall designate a "sample custodian." An alternate will be designated in his absence. In addition, the laboratory shall set aside a "sample storage security area." This should be a clean, dry, isolated room which can be securely locked from the outside.
2. All samples should be handled by the minimum possible number of persons.
3. All incoming samples shall be received only by the custodian, who will indicate receipt by signing the Chain of Custody Record Sheet

Chain of Custody Procedures (Continued)

accompanying the samples and retaining the sheet as permanent records. Couriers picking up samples at the airport, post office, etc. shall sign jointly with the laboratory custodian.

4. Immediately upon receipt, the custodian will place the sample in the sample room, which will be locked at all times except when samples are removed or replaced by the custodian. To the maximum extent possible, only the custodian should be permitted in the sample room.
5. The custodian shall ensure that heat-sensitive or light-sensitive samples, or other sample materials having unusual physical characteristics, or requiring special handling, are properly stored and maintained.
6. Only the custodian will distribute samples to personnel who are to perform tests.
7. The analyst will record in his laboratory notebook or analytical worksheet, identifying information describing the sample, the procedures performed and the results of the testing. The notes shall be dated and indicate who performed the tests. The notes shall be retained as a permanent record in the laboratory and should note any abnormalities which occurred during the testing procedure. In the event that the person who performed the tests is not available as a witness at time of trial, the government may be able to introduce the notes in evidence under the Federal Business Records Act.
8. Standard methods of laboratory analyses shall be used as described in the "Guidelines Establishing Test Procedures for Analysis of Pollutants," 38 F.R. 28758, October 16, 1973. If laboratory personnel deviate from standard procedures, they should be prepared to justify their decision during cross-examination.
9. Laboratory personnel are responsible for the care and custody of the sample once it is handed over to them and should be prepared to testify that the sample was in their possession and view or secured in the laboratory at all times from the moment it was received from the custodian until the tests were run.
10. Once the sample testing is completed, the unused portion of the sample together with all identifying tags and laboratory records, should be returned to the custodian. The returned tagged sample will be retained in the sample room until it is required for trial. Strip charts and other documentation of work will also be turned over to the custodian.

Chain of Custody Procedures (Continued)

11. Samples, tags and laboratory records of tests may be destroyed only upon the order of the laboratory director, who will first confer with the Chief, Enforcement Specialist Office, to make certain that the information is no longer required or the samples have deteriorated.

EXHIBIT I

EPA, NATIONAL ENFORCEMENT INVESTIGATIONS CENTER			
Station No.	Date	Time	Sequence No.
Station Location			☐ Grab ☐ Comp.
☐ BOD ☐ Solids ☐ COD ☐ Nutrients	☐ Metals ☐ Oil and Grease ☐ D.O. ☐ Bact. ☐ Other	Remarks/Preservative:	
Samplers:			

Front

ENVIRONMENTAL PROTECTION AGENCY
 OFFICE OF ENFORCEMENT
 NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
 BUILDING 53, BOX 25227, DENVER FEDERAL CENTER
 DENVER, COLORADO 80225



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ENVIRONMENTAL PROTECTION AGENCY
Office Of Enforcement
NATIONAL ENFORCEMENT INVESTIGATIONS CENTER
Building 53, Box 25227, Denver Federal Center
Denver, Colorado 80225

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APPENDIX D
Analytical Procedures and Quality Control

ANALYTICAL PROCEDURES AND QUALITY CONTROL

Samples collected during this survey were analyzed, where appropriate, according to procedures approved by EPA for the monitoring of industrial effluents.* The analytical procedures for characterizing trace organic chemical pollutants are described below. The remaining procedures are listed in the following table.

<u>Parameter</u>	<u>Method</u>	<u>Reference</u>
Fe, Pb, Zn	Atomic absorption	EPA Methods for Chemical Analyses of Water and Wastewater, 1971, p 83
TSS	Gravimetric	ibid., p 278
Cyanide	Distillation, colorimetric	ibid., page 41
Phenol	Automated colorimetric	EPA Methods for Chemical Analyses of Water and Wastes, 1974, p 243
Ammonia	Automated phenate	ibid., page 168
Oil/grease	Freon extraction	Standard Methods, 13th Ed., p 254
Settleable Solids	Volumetric	ibid., page 539

Samples for organic chemical pollutant analysis were collected in clean, solvent-rinsed one-gallon glass containers. These samples were air-freighted to Denver and extracted with methylene chloride. The extract was dried with anhydrous sodium sulfate, concentrated, exchanged into acetone and analyzed by hydrogen flame ionization gas chromatography. Those samples that showed adequate response were set aside for characterization by combined gas chromatography-mass spectrometry (GC/MS). The

* *Federal Register*, Vol. 40, No. 111, June 9, 1975

GC/MS analyses were carried out with a Finnigan Model 1015 Quadropole Mass Spectrometer and a Systems Industries Model 150 computerized data system. Mass spectra were compared to data files in the NIH Computer System and also to listings in the *Eight Peak Index of Mass Spectra*, Second Edition, 1974, compiled by the Mass Spectrometry Data Center. All identifications are considered preliminary until authentic standards of the suspected chemical compounds can be obtained and analyzed under similar conditions to match the mass spectrum and gas chromatographic retention time. This procedure does not detect highly volatile organic chemical pollutants since their presence is masked by the extraction solvent.

Reliability of the analytical results was documented through an active Analytical Quality Control Program. As part of this program, replicate analyses were normally performed with every tenth sample to ascertain the reproducibility of the results. In addition, where appropriate, every tenth sample was spiked with a known amount of the constituents to be measured and reanalyzed to determine the percent recovery. These results were evaluated in regard to past AQC data on the precision, accuracy and detection limits of each test. On the basis of these findings, all analytical results reported for the survey were found to be acceptable with respect to the precision and accuracy control of this laboratory.